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ENVIRONMENTAL ASSESSMENT BOARD



ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 113

DATE: Tuesday, February 25, 1992.

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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(416) 482-3277

2300 Yonge St. Suite 709 Toronto, Canada M4P 1E4

ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act,
R.S.O. 1980, c. 140, as amended, and Regulations
thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro
consisting of a program in respect of activities
associated with meeting future electricity
requirements in Ontario.

Held on the 5th Floor, 2200
Yonge Street, Toronto, Ontario,
on Tuesday, the 25th day of February,
1992, commencing at 10:00 a.m.


VOLUME 113

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

S T A F F :

MR. M. HARPUR	Board Counsel
MR. R. NUNN	Counsel/Manager, Information Systems
MS. C. MARTIN	Administrative Coordinator
MS. G. MORRISON	Executive Coordinator



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A P P E A R A N C E S

B. CAMPBELL)	ONTARIO HYDRO
L. FORMUSA)	
B. HARVIE)	
J.F. HOWARD, Q.C.)	
J. LANE)	
G. A. KARISH)	
J.C. SHEPHERD)	IPPSO
I. MONDROW)	
J. PASSMORE)	
R. WATSON)	MUNICIPAL ELECTRIC
A. MARK)	ASSOCIATION
S. COUBAN)	PROVINCIAL GOVERNMENT
P. MORAN)	AGENCIES
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D. ESTRIN)	UNITED CHIEFS AND COUNCILS
		OF MANITOULIN, UNION OF
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D. STARKMAN)	GROUPS
D. ARGUE)	
T. ROCKINGHAM		MINISTRY OF ENERGY
B. KELSEY)	NORTHWATCH
L. GREENSPOON)	
P. McKAY)	
J.M. RODGER		AMPCO
M. MATTSON)	ENERGY PROBE
D. CHAPMAN)	
A. WAFFLE		ENVIRONMENT CANADA
M. CAMPBELL)	ONTARIO PUBLIC HEALTH
M. IZZARD)	ASSOCIATION, INTERNATIONAL
		INSTITUTE OF CONCERN FOR
		PUBLIC HEALTH
G. GRENVILLE-WOOD		SESCI

A P P E A R A N C E S

(Cont'd)

D. ROGERS		ONGA
H. POCH)	CITY OF TORONTO
J. PARKINSON)	
R. POWER		CITY OF TORONTO, SOUTH BRUCE ECONOMIC CORP.
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F. MACKESY		ON HER OWN BEHALF
D. HUNTER)	DOFASCO
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B. TAYLOR)	MOOSONEE DEVELOPMENT AREA
D. HORNER)	BOARD AND CHAMBER OF
H. WATSON)	COMMERCE

A P P E A R A N C E S
(Cont'd)

T. HEINTZMAN)	ATOMIC ENERGY OF CANADA
D. HAMER)	
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P.A. NYKANEN)	CANADIAN MANUFACTURERS ASSOCIATION - ONTARIO
G. MITCHELL		SOCIETY OF AECL PROFESSIONAL EMPLOYEES
S. GOUDGE		CUPE
D. COLBORNE		NIPIGON ABORIGINAL PEOPLES' ALLIANCE
R. CUYLER		ON HIS OWN BEHALF

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1 ---Upon commencing at 10:02 a.m.

2 THE REGISTRAR: This hearing is now in
3 session. Please be seated.

4 THE CHAIRMAN: Mr. Campbell?

5 MR. M. CAMPBELL: Thank you.

6 ARTHUR RAYMOND EFFER,
7 CHARLES WILLIAM DAWSON,
8 JAMES RICHARD BURPEE,
9 GARY NEIL MEEHAN,
JOHN DOUGLAS SMITH,
AMIR SHALABY; Resumed.

10 CROSS-EXAMINATION BY MR. M. CAMPBELL (Cont'd):

11 Q. I wonder, Dr. Effer, if you could
12 turn to page 87 of Exhibit 468. I would like to go
13 through the section on Human Exposure to Airborne
14 Pollutants, if I may. Do you have that?

15 DR. EFFER: A. Excuse me, Mr. Campbell.
16 May I refer you to the question that you addressed to
17 me yesterday about dioxins and furans?

18 Q. Certainly.

19 A. You had an interrogatory, 8.17.22, on
20 stack emissions, and there was an attachment to that of
21 work carried out by Ortech International, consultants
22 to Hydro, in which a fair amount of detail on that
23 subject was given to you.

24 Q. Fine. Thank you. Now, I wonder --

25 THE CHAIRMAN: Has that interrogatory

1 been referred to before?

2 MR. M. CAMPBELL: I haven't referred to
3 it, no.

4 THE CHAIRMAN: Perhaps it should be given
5 a number. We haven't got the Registrar here. Perhaps
6 we should give it a number. We will try and remember
7 to put it on the record later on.

8 MR. M. CAMPBELL: Fine. Thank you.
9 Should the Ortech report be referred to separately? It
10 was an attachment to the response. There were a couple
11 of reports, if I remember correctly.

12 DR. EFFER: The summary of the report was
13 attached to the interrogatory, the tables and
14 summaries.

15 MR. M. CAMPBELL: Perhaps what I might
16 do, Mr. Chairman, is examine the response to the
17 Interrogatory, and if there is indeed a separate report
18 I can speak to Mr. Howard about having it produced
19 later.

20 THE CHAIRMAN: Fine.

21 MR. M. CAMPBELL: Q. Now, if we could
22 turn to page 7, Section 6.8, Human Exposure to Airborne
23 Pollutants, I take it, Dr. Effer, that in the second
24 paragraph, under the heading 6.8.1, Introduction, that
25 we are talking again of two different broad categories

1 of health effects, the emissions respecting the
2 respiratory system, and secondly, carcinogens; is that
3 correct?

4 DR. EFFER: A. That is correct.

5 Q. It appears that Hydro has conducted a
6 number of studies, and they are set out in paragraph
7 6.8.2, and with specific reference to the DSP there
8 have been two studies, regional and local; is that
9 correct?

10 A. That is correct, yes.

11 Q. Can we turn the page to page 88, and
12 at heading 6.8.3.1 there is a description of the
13 Regional Scale Health Impact Assessment Studies. That
14 I believe has been produced and so on. The Concord
15 study is referred to in the bibliography here, if I
16 remember correctly.

17 A. That's correct, yes.

18 Q. The second study, though, is a Local
19 Scale Risk Assessment, and this study is focused on the
20 Lambton area; is that correct?

21 A. Yes, we used the Lambton area as a
22 model site.

23 Q. And you used at the very last lines
24 on page 88: both individual and population wide health
25 risks?

1 A. That's correct, yes.

2 Q. I believe we can go over to page 90
3 where we have the results of the study; is that
4 correct? This is the results of the Lambton study; is
5 that correct?

6 A. Yes.

7 Q. Now, the first point I wish to make
8 is - and perhaps you can correct me if I am incorrect -
9 the results which you have listed here speak only to
10 cancers; is that correct?

11 A. Yes.

12 Q. It does not refer to non-cancers?

13 A. That is correct.

14 Q. Now, do you have any results with
15 respect to non-cancers anywhere?

16 A. The data that we put in the report is
17 related to the respiratory impact of sulphur dioxide
18 and nitrogen oxides, and it is recorded in the report
19 in terms of how these levels relate to the air quality
20 standards. That is the extent of the non-carcinogenic
21 impacts that we have found.

22 Q. But you do not have an analysis of
23 that equivalent to the analysis which you have on
24 cancer; is that correct?

25 A. No, that is correct.

1 Q. Now, I would turn to the very last
2 paragraph on page 90 where there appears to be some
3 form of conclusion, and I wonder if we could virtually
4 go through this almost line by line.

5 The first line reads:

6 The total maximum individual risk due
7 to DSP option 1, electric generation of
8 2.37 gigawatt per year, is estimated to
9 be 1.8 to the minus 6, which can be
10 normalized.

11 Now, what do you mean by "normalized"?

12 A. That is the term that we use to
13 relate, in this case, the risk based on a standard
14 amount of electricity generated.

15 In other words, here the gigawatt hours
16 actually generated by the option 1 operation, which is
17 listed in the earlier part of the report, we divide
18 that by the number to bring it down to a standard
19 amount of standard gigawatthours.

20 Q. Now, when you say 1.8(e) to the minus
21 6, you mean point-approximately-two per million; is
22 that a rough layman's term?

23 A. Yes.

24 Q. So if you say the risk is two per
25 million which can being normalized as that, what does

1 that mean in lay terms?

2 A. It means that we divided the 1.8 per
3 million, divided it by 2.37, which is the number of
4 gigawatthours produced, to produce a slightly lower
5 figure, which is 7.6 to the 10 millionth.

6 Q. Right. Okay. Now, this is with
7 respect to the population in the Sarnia area; is that
8 correct?

9 A. That is correct.

10 Q. So you could not extrapolate this to
11 the province as a whole or to the areas in the province
12 around other plants, could you?

13 A. Not in the sense of a direct
14 extrapolation. We can use the methodology we have
15 adopted here to do so.

16 Q. What is the approximate population in
17 the Sarnia area covered by this study?

18 A. I would have to refer you to the
19 population distribution table, which --

20 Q. Perhaps I can help you. I think it's
21 approximately 60,000, is that correct, residing in
22 the -- I'm sorry, approximately 78,000? If you look
23 just up the page.

24 A. Oh. Right. Yes.

25 Q. So that the rate is then related to

1 the number of people in the subject area; is that
2 correct?

3 A. It is related to the populations in
4 individual squares covering that receptor area.

5 Q. Right. The second sentence in that
6 last paragraph at the bottom of page 90:

7 The generally accepted range of
8 lifetime cancer risk for a project is 10
9 to the minus 4 to 10 to the minus 6.

10 Can you define "lifetime cancer risk"? What do you
11 mean by that?

12 A. This is the probability of a person
13 contracting cancer during their lifetime when exposed
14 to a stated risk.

15 Q. The range is 10 to the minus 4,
16 approximately one in 10,000; is that correct?

17 A. Right.

18 Q. To 10 to the minus 6. That is one in
19 a million; is that correct?

20 A. Correct, yes.

21 Q. But then you go on to say:

22 That is a "mir" greater than 10 to
23 the minus 4 is unacceptable, while a
24 "mir" below 10 to the minus 6 is
25 acceptable.

1 Now, I see there is a gap there. Can you explain that
2 gap to me?

3 A. What this reference refers to is that
4 it is a judgment that one in a million is an acceptable
5 risk whereas one in 10,000 borders on the unacceptable.

6 Q. So what happens in the gap, the one
7 in 100,000? Is that acceptable or unacceptable?

8 A. It gets more acceptable as the
9 number, as the probability declines.

10 Q. Is that a standard that is recognized
11 in industry, that one in 10,000 is unacceptable; there
12 is a range which is acceptable or borders on the
13 acceptable, and one in a million is clearly acceptable?
14 Is that a standard?

15 A. There is no strict agreement between
16 practitioners, but I think there is a general
17 understanding that when it does get into that range it
18 becomes an acceptable figure.

19 Q. You then go on to say that a value of
20 1.8 to the minus 6 can be considered acceptable. That
21 would be in lay terms one in 500,000; is that correct?

22 A. It is two in a million.

23 Q. Fair enough, two in a million.

24 A. Yes.

25 Q. And you then say, "This is a worst

1 case situation." That means maximum emissions; is that
2 correct?

3 A. Yes. There are a number of
4 conservative factors which have gone into that figure.

5 Q. Can you tell me some of those
6 conservative factors?

7 [10:13 a.m.]

8 A. One is that if we follow through the
9 emissions through to the transport and the deposition,
10 the emissions are based on an 80 per cent capacity
11 factor which is quite a high assumption for a typical
12 fossil plant.

13 We also are assuming that there are no
14 scrubbers and in future there will be likely scrubbers
15 which will as yet provide an unknown amount of
16 reduction in trace elements.

17 In the modelling exercise, the model we
18 use is such that we believe it has several very
19 conservative assumptions; in other words, the
20 calculated ground level concentrations of the pollutant
21 tend to be much higher than what is actually
22 experienced by experimental measurement.

23 If you will forgive me for a minute, I
24 think I have a --

25 I can't readily put my hand to any

1 others, but those are examples of several
2 uncertainties. The other one which I can briefly
3 mention is that the receptor, the receptor
4 sensitivities are very variable the exposure which we
5 have assumed is a lifetime exposure and it is, in all
6 probability, very unlikely that the people will be
7 spending a 70-year period actually in that square of
8 that area. So those are some of the conservative
9 elements of the modelling.

10 Q. Thank you. On page 91, I believe we
11 have the population in grids. And right in the centre
12 of that chart, one would find the plant; is that
13 correct?

14 A. Yes.

15 Q. And you have looked only at the
16 Canadian side?

17 A. That is correct, yes.

18 Q. The next page, page 92, shows the
19 pollution concentration levels on an annual basis; is
20 that correct?

21 A. Yes.

22 Q. That would show where the primary
23 areas of risk occur?

24 A. Yes.

25 Q. And then on page 93, you have drawn

1 some further conclusions, and you draw a comparison
2 between the risk of living in this area and daily risks
3 of life.

4 I wonder if you could perhaps turn to
5 Exhibit 485, the extract from the report of the Royal
6 Commission on electric power planning which I gave you
7 the other day?

8 Do you have that, Doctor?

9 A. Yes.

10 Q. On page 93 of Exhibit 468, the
11 sentence reads as follow:

12 It can be seen that the risk to an
13 individual due to DSP option No. 1 is
14 equivalent to twice the values listed in
15 figure 6.6, and there is a range a daily
16 risk.

17 A. I am sorry, my copy finishes at 86.

18 Q. Sorry.

19 THE CHAIRMAN: You are back at 468,
20 aren't you?

21 MR. M. CAMPBELL: I am back and forth,
22 that's right, Exhibit 468. I am just reading and
23 trying to relate these two. I am sorry.

24 Q. I am at page 93 of Exhibit 468 and I
25 am reading from the bottom paragraph. And the

1 comparison is drawn between maximum individual
2 incremental risk due to DSP option 1 equivalent to the
3 risk of an individual smoking 2.8 cigarettes a day or a
4 non-smoker living four months with a cigarette smoker.
5 That is the comparison which is drawn; is that correct?

6 DR. EFFER: A. Correct.

7 Q. Now, if you look at the exhibit which
8 I produced the other day, Exhibit 485, under the
9 heading of Interpretation of Risk, this is a report
10 prepared by Arthur Porter, 10, 11 years ago, but I
11 think it has some value.

12 Under the heading Interpretation of Risk,
13 they define risk and then they look at attributes of
14 risk.

15 In the second line of that paragraph, it
16 says:

17 A risk may be voluntary or
18 involuntary. Voluntary risks imply that
19 the risktaker has an acceptable
20 alternative available to him and can
21 avoid taking the risk.

22 And the next attribute he defines is:

23 Risks may also be described as
24 equitable or inequitable. That takes
25 into consideration distribution of risks

1 and benefits. The person who takes the
2 risk also reaps the benefit, then it is
3 equitable.

4 My question to you is whether - there are
5 other factors also included in this paragraph, but for
6 this point - is the comparison of the incremental risk
7 due to DSP option 1 truly equivalent to the risk of a
8 person smoking 2.8 cigarettes a day or a non-smoker
9 living four months, if you look at these attributes of
10 risk?

11 A. I agree with the Board Commission
12 that the attributes are taken into account and need to
13 be taken into account and used as modifiers and that
14 the strictly mathematical comparisons that we have made
15 here do not bring into consideration what you have
16 quoted here.

17 Q. In effect, the health impact, the
18 health effect document is an assessment of risk; should
19 it not assess the risk, whereas what you have done here
20 is switched into evaluating the risk.

21 A. That is correct.

22 Q. And the distinction was not fully
23 clear in the report which you produced, Exhibit 468?

24 A. That's correct, yes.

25 DR. CONNELL: Excuse me, could I, just

1 before we leave this matter, go back to the units?

2 Could you explain the GWA to me?

3 DR. EFFER: That is a gigawatt per annum.

4 DR. CONNELL: I see. You were using

5 gigawatthour I think, but this is --

6 DR. EFFER: Gigawatthour. Did I say

7 gigawatthours?

8 DR. CONNELL: I think so. This is a

9 gigawatt year.

10 DR. EFFER: Yes, this is a gigawatt year,

11 yes, I am sorry.

12 DR. CONNELL: Yes, thank you.

13 MR. M. CAMPBELL: Q. Can we now turn to

14 page 94, Dr. Effer, please? And I would like to ask

15 you about the paragraph which begins in bold, "The

16 total population risk."

17 Can you explain that in greater detail,

18 please, the sentence:

19 The estimated total population excess

20 cancer burden is 5.3 to the minus 2.

21 Can you explain what that means?

22 DR. EFFER: A. We followed the formula

23 that was given on an earlier page to assess the total

24 population risk and that briefly is to integrate the

25 unit risk factors multiplied by the population and the

1 concentration experienced at each of the squares. And
2 for each square calculated that, using the population
3 figure for each of the squares. Then, having added
4 that result in each of the squares, we have divided the
5 answer by 70 and that gives the total population risk.

6 Q. In one year; is that correct?

7 A. Yes, yes.

8 Q. Now, can you explain then the notion
9 of an additional case of cancer every 19 years? What
10 does that mean in terms of the population and what does
11 that mean in terms of the life of the Plan?

12 A. That figure is derived from the
13 5.3(e) to the minus 2 and says that there are five per
14 100 which translates to one additional case in 19. And
15 again, we normalized that figure by dividing the
16 gigawatts per year to arrive at that final number.

17 [10:25 a.m.]

18 Q. Can you explain that in perhaps lay
19 terms? What does that mean in terms of the people in
20 this area?

21 A. By this calculation there is a
22 probability that by the emissions and the depositions
23 and the exposures calculated using this method that the
24 total burden to the population, total effect on the
25 population in the areas studied will cause an

1 additional case of cancer every 19 years of exposure.

2 Q. Is that for every year or for every
3 19 years?

4 A. It is the annual incidence.

5 Q. So that would be every year?

6 A. Yes.

7 Q. 6.8.3.3, the Summary of Human Health
8 Effects, is this summary relating to -- I had a little
9 difficulty understanding this summary. Was it relating
10 to the entire report? I'm sorry, Exhibit 468, page 94.

11 A. Yes?

12 Q. 6.8.3.3, Summary of Human Health
13 Effects, is this with respect to the Sarnia/Lambton
14 study or is this with respect to the entire report?

15 A. Which part of this section are you
16 referring to?

17 Q. The heading 6.8.3.3. It's titled
18 Summary of Human Health Effects. Is that relating only
19 to the Lambton study, or does that relate to the entire
20 health effects report?

21 A. The second paragraph refers to the
22 first study done by consultants, which was the basis
23 for the Energy Board submission, and it summarizes it
24 in just that one paragraph. The third and bottom
25 paragraph on that page summarizes the bulk of the

1 studies that we have been doing.

2 Q. All of the studies that you have been
3 doing?

4 A. Yes.

5 Q. And the last sentence in the bottom
6 of page 94 says:

7 The calculated total maximum
8 individual risk of 1.8 to 10 to the minus
9 6 is not very different from risks of
10 daily life and is considered to be
11 acceptable by the U.S. EPA.

12 You do not have a discussion of the risks of daily life
13 in the terms that we discussed which were set out in
14 the Porter report?

15 A. Only inasfar as figure 6.6 covers--

16 Q. Fair enough.

17 A. --some aspects of that.

18 Q. I would like to leave Exhibit 468 and
19 then just put some questions on Exhibit 344, the
20 Alternative Energy Review, and in particular I am
21 interested in the cost models.

22 My question is perhaps a simple one. If
23 the health effects were quantified in dollar terms,
24 hospital admissions, cost of physicians and so on, and
25 those costs taken into account in the assessment of

1 alternative energy sources would this have the effect
2 of making alternative energy sources more economical,
3 more beneficial? Do you have any information on that?

4 MR. SHALABY: A. If you increase the
5 benefit of the alternative energy sources it would look
6 more attractive, yes.

7 Q. Do you have any calculations or
8 numbers to show the point where the alternative energy
9 option becomes viable? Do you have any dollar figures
10 that might assist in that?

11 A. Some of the sensitivity cases that we
12 have in Exhibit 344 show you approximately when the
13 breakeven point is. They don't determine exactly where
14 the breakeven point is, but for wind, for example, in
15 the year 2000 with some favourable assumptions the
16 cost/benefit ratio becomes fairly close to 1.

17 Q. Is Hydro conducting any studies to
18 try to quantify this in greater detail, and do those
19 studies include the health costs we have just been
20 discussing?

21 A. Not quantifying the health costs, no,
22 we are not.

23 Q. The last series of questions I have
24 is on Exhibit 452, and my question relates to
25 non-utility generation, which is referred to on page 25

1 of Exhibit 452.

2 Under the heading Fossil Emissions, the
3 sentence reads:

4 Emission levels of the updated
5 Demand/Supply Plan are illustrated in
6 figures 9, 4, 5 and 6. These results do
7 not include emissions from non-utility
8 generation, nor from natural gas
9 associated with fuel switching.

10 Do you have any information respecting the levels of
11 emissions which one might expect from non-utility
12 generation?

13 A. I think we tried to give an
14 indication earlier in the evidence that we haven't done
15 the exact calculations, but there are indications in
16 Exhibit 4 for the previous quantities of non-utility
17 generation. That would give you an order of magnitude.

18 Q. An order of magnitude?

19 A. It's about half the non-utility
20 generation roughly, and the SO(2) and NOx emissions
21 related to NUGs are in that exhibit.

22 Q. So that there is indeed a --

23 A. And it was drawn to my attention that
24 there were corrections made to that graph as well.

25 Q. Very well. My last question is on

1 Exhibit 452. There is the concept of extending the
2 life of the various plants. Do you have any
3 information on whether or not there will be an increase
4 in the level of emissions over that life extension
5 period?

6 A. In fact, Exhibit 452 indicates that
7 there would be additional environmental controls
8 associated with life extension. Pages 26 and 27 of
9 Exhibit 452 show what the emissions are projected to be
10 under median load growth. But in general, life
11 extension has, hand in hand with it, more stringent
12 environmental controls.

13 MR. M. CAMPBELL: Those are my questions,
14 Mr. Chairman.

15 THE CHAIRMAN: Thank you, Mr. Campbell.
16 Is Mr. Starkman next?

17 Good morning, Mr. Starkman.

18 MR. STARKMAN: Good morning, Mr.
19 Chairman. I have some background materials which I had
20 previously distributed to the Panel and to the
21 Registrar, and if we could give them an exhibit number
22 that would be --

23 THE CHAIRMAN: Before I forget - I'm
24 sorry to interrupt - we have got to put an
25 interrogatory on the record, 8.17.22.

1 THE REGISTRAR: 8.17.22 is 475.17.

2 THE CHAIRMAN: Thank you.

3 ---EXHIBIT NO. 475.17: Interrogatory No. 8.17.22.

4 THE CHAIRMAN: Now, you have some
5 exhibits, do you, Mr. Starkman?

6 THE REGISTRAR: Next exhibit number is
7 486.

8 ---EXHIBIT NO. 486: Background material's to be used
9 in cross-examination of Panel 8.

10 CROSS-EXAMINATION BY MR. STARKMAN:

11 Q. Thank you and good morning. My name
12 is David Starkman, and I represent the Coalition of
13 Environmental Groups. With me is David Argue, who is
14 the case manager for the Coalition.

15 I have I think what are some brief
16 questions primarily concerning the environmental impact
17 of the fossil plants. I just wanted to start perhaps,
18 Dr. Effer, following up on some of the things that Mr.
19 Campbell was asking questions about.

20 Hydro has presented a considerable amount
21 of evidence concerning emissions from the various
22 operating fossil plants, and I am just wondering where
23 that data comes from. I guess specifically does Hydro
24 have, or has it had, an on-going monitoring process at
25 its plant to determine the emissions from the various

1 facilities?

2 DR. EFFER: A. We don't have it on-going
3 in the sense of continuous emission monitoring, but the
4 basis for the majority of these emission data were from
5 actual measurements taken at our generating stations,
6 supplemented by data where necessary from other
7 sources.

8 Q. Yes. Well, can we just look at each
9 plant or comment on each plant individually, and can
10 you tell me what sort of monitoring there has been,
11 say, through the '80s?

12 A. We have done work in 1986 at Lambton.

13 Q. Yes? How long did that project last?

14 A. Well, I don't know what period the
15 monitoring lasted.

16 Q. Was it stack monitoring or point of
17 impingement monitoring, or both?

18 A. Stack monitoring.

19 Q. All right. Sorry, you did stack
20 monitoring. Do you know if that went on for a day, a
21 week, a month?

22 A. It was done under a variety of
23 operating conditions, so it would be very likely over
24 an extended period.

25 Q. What's an extended period - a day,

1 week, month, months?

2 A. Several days up to weeks, I would
3 guess, depending on the difficulty of getting there at
4 the right time. The work was done at various loads on
5 the units, and so it had to be done at specific times.

6 Q. By "various loads" you mean start-up
7 mode?

8 A. Yes, yes.

9 Q. Immediate mode, operating mode, and
10 shutdowns?

11 A. That's correct.

12 Q. Sorry. I interrupted you.

13 A. The Lambton study. Then there was
14 another study done at Lakeview in, I think, 1989, and
15 then as part of a Canadian Electrical Association study
16 on trace elements Nanticoke was selected as one of
17 those stations representative of a coal burning
18 station, and that is where CEA's consultants carried
19 out the stack monitoring for emissions.

20 Q. So there was Lambton in '86, Lakeview
21 in '89, and the CEA study at Nanticoke, when was that?

22 A. It is a little before that.
23 Somewhere around '86, I would think.

24 Q. The Lakeview study in '89, was that
25 stack monitoring or point of impingement, or both?

1 A. Stack monitoring.

2 Q. And in the Nanticoke it was stack
3 monitoring too, I think you mentioned.

4 A. Yes.

5 Q. Has there been any other monitoring
6 of Hydro's fossil generating facilities other than the
7 three you have mentioned?

8 A. I am not aware of any stack
9 monitoring done at other stations other than the three
10 that I have mentioned.

11 However, you have brought up the ground
12 level concentrations. That monitoring is done much
13 more extensively at each of our stations.

14 [10:38 a.m.]

15 Q. And where has that monitoring been
16 done or how is it done?

17 A. It has been done at every fossil
18 station.

19 Q. Is it done continuously?

20 A. Let's say it has been done on a
21 semi-continuous basis. There is difficulty in
22 maintaining equipment at some stations such as Atikokan
23 which is very difficult to access some of the
24 monitoring sites, so data can be regarded as spasmodic
25 in some situations.

1 MR. BURPEE: A. If I might add, Dr.
2 Effer, every operating station has a ring of SO(2)
3 monitors around it. Distances vary. Some are at 5
4 kilometres, some at 10 kilometres. Those are recorded
5 on a continuous basis and all that data is captured.
6 SO(2) is the primary one. I know Atikokan has at least
7 one ozone monitor.

8 THE CHAIRMAN: I am sorry, I couldn't
9 hear that.

10 MR. BURPEE: At Atikokan, also I know,
11 just outside the Town of Atikokan, there is a monitor
12 for ozone as well. I recall that, but SO(2) is the
13 primary one, but it is recorded on a continuous basis.

14 MR. STARKMAN: Q. Around all the fossil
15 stations?

16 MR. BURPEE: A. Around all the fossil
17 stations.

18 Q. Other than SO(2), are you ground
19 monitoring, if I can use that term, for anything else?

20 DR. EFFER: A. Yes. We are monitoring
21 at some stations nitrogen oxides and as Mr. Burpee
22 said, ozone. I believe ozone has also been monitored
23 at around Nanticoke.

24 Q. Around?

25 A. Around Nanticoke.

1 Q. Yes?

2 A. And also we monitor for, again, total
3 suspended matter, bulk measurements in the atmosphere.

4 Q. How do you do that monitoring?

5 A. That is essentially drawing high
6 volumes of air through onto a filter and measuring the
7 amount of material taken on to the filter.

8 Q. And how often do you do that?

9 A. I don't believe that is a continuous
10 measurement, but Mr. Burpee may have some information.

11 MR. BURPEE: A. Yes. I am not sure
12 about that method, but also it would record dust fall
13 around all stations as well, which is just collecting
14 dust in an open container and analyzing how much is --
15 that is mainly for fugitive dust emissions such as coal
16 or ash.

17 MS. PATTERSON: Where is the total
18 suspended solids monitoring; where was that done?

19 DR. EFFER: I am sorry, I missed that.

20 MS. PATTERSON: You talked about total
21 suspended solids monitoring.

22 Did you say where that was done or is
23 that a general practice?

24 DR. EFFER: It is not, I believe, a
25 general practice. I can't say exactly what stations it

1 has been done, but the monitoring equipment I know
2 exists, but where it is actually being used, I don't
3 know at the moment.

4 MR. STARKMAN: Q. So you know that that
5 type of equipment exists, but you don't know where it
6 has been used or how often it has been used?

7 DR. EFFER: A. It has been used around
8 generating stations.

9 Q. It has been used, but you don't know
10 how often it has been used or at what stations?

11 A. That's correct.

12 Q. All right.

13 MR. DAWSON: A. Though I think it is
14 true to say that dust fall monitoring is done at all
15 the stations.

16 Q. Okay.

17 A. So we do measure dust fall. We
18 measure the amount of dust that has collected in a
19 given area and that is done on a monthly basis at all
20 the stations, and then it is analyzed to determine what
21 percentage of that dust is coal, what percentage of it
22 is flyash and what percentage of it is extraneous
23 material.

24 Q. Dr. Effer, am I correct that
25 compliance with Regulation 308 under the Environmental

1 Protection Act is essentially a point of impingement or
2 ground monitoring type of system?

3 DR. EFFER: A. Yes. We have to conform
4 to air quality guidelines which measures the air in
5 point of impingement.

6 Q. Now, with the type of evidence that
7 you have been giving me, it strikes me that how do you
8 know you are in compliance with the various aspects of
9 the regulation when you have this sort of, what I would
10 perceive as a kind of sporadic monitoring procedure?

11 A. We can position our monitors at
12 locations surrounding the plant where by calculation,
13 we know there is a high probability of the maximum
14 ground level concentration being experienced, depending
15 again on the wind direction. Those measurements are
16 the basis for informing the regulatory agencies that we
17 are conforming to the air quality guidelines.

18 Q. Yes, and that type of monitoring,
19 that is what I have been trying to ask you about, do
20 you do that?

21 A. Yes.

22 Q. And how often do you do that, or you
23 have already described it to me and that is the extent
24 of it?

25 A. Yes.

1 Q. All right. There is another
2 interrogatory I would like to refer to. I distributed
3 it this morning and the Registrar has copies. It is
4 91 -- excuse me, it is 8.17.21.

5 THE REGISTRAR: 8.17.21 is 475.18.

6 ---EXHIBIT NO. 475.18: Interrogatory No. 8.17.21.

7 MR. STARKMAN: Q. I guess this question
8 is for you, Dr. Effer. Hydro has presented evidence
9 with respect to acid gas emissions, carbon emissions
10 and so forth. And I take it that what this
11 interrogatory is indicating is that your evidence has
12 not come from an actual monitoring of the stack
13 emissions with respect to these gases.

14 DR. EFFER: A. Some stack monitoring for
15 these emissions has been done.

16 Q. Well, okay. I asked you about that
17 and you told me about the three, Lambton, Lakeview and
18 Nanticoke.

19 And other than that --

20 A. No, I am not aware of any other stack
21 monitoring.

22 Q. All right. So, other than those
23 three, the numbers you have presented with respect to
24 the stack emissions comes as described--

25 A. Yes.

1 Q. --in 8.7.21 which is essentially an
2 extrapolation from the amount of fuel burned?

3 A. That's correct.

4 Q. All right. And would you say the
5 same about the heavy metal emissions from the various
6 plants?

7 A. That applies the data from Nanticoke,
8 Lambton and Lakeview have been measured, but I am not
9 aware of any other measurements for heavy metals at the
10 other stations.

11 Q. All right. And what about for
12 dioxins and furans?

13 A. The same.

14 Q. The same. So, it is the three
15 examples which gave you the data which you have
16 presented on those, on emissions of heavy metals,
17 dioxins and furans?

18 A. That is all I am aware of, those
19 three stations.

20 Q. And you are satisfied with the
21 reliability of that?

22 A. They were done by --

23 THE CHAIRMAN: I am sorry, which three
24 stations? I am sorry, I can't hear you very well.
25 Which were the three stations you said?

1 DR. EFFER: The three stations were
2 Lambton, Lakeview and Nanticoke.

3 MR. STARKMAN: Q. That is Lambton in
4 '86, Lakeview in '89, and the Electrical Association's
5 testing at Nanticoke in around '86?

6 DR. EFFER: A. Those are not firm dates.
7 It is about those times, yes.

8 Q. Okay. The question was: You are
9 satisfied with the reliability of that data? There has
10 been no update on it since the mid '80s?

11 A. We are confident that the work that
12 was -- that the people that were doing the work, the
13 consultants, were reliable consultants and provided the
14 results which are accurate. And the data is
15 representative of the coal and the boiler conditions at
16 that time.

17 Q. Yes. But, Dr. Effer, since, let's
18 say '86, between '86 and '90 or '91, couldn't the
19 situation in any particular plant change?

20 A. Yes. There have been several changes
21 in the types of fuel that have been burned, the mix of
22 fuel, which is predominantly a factor which will alter
23 these emission rates.

24 Q. And there is also a deterioration of
25 equipment? I am not aware of how deterioration of

1 equipment might affect the emission rates.

2 MR. BURPEE: A. With regards to SO(2), I
3 don't think deterioration would have any impact. NOx
4 can be influenced by the amount of air and the flame
5 temperature, or they can be influenced by day-to-day
6 operations issues, but as with regards to dioxins,
7 furans, I have no idea how deterioration of equipment
8 would impact on that.

9 Q. Let me ask you this: I heard some
10 evidence from Dr. Effer I think yesterday, that if you
11 burn at a high temperature, you tend to burn off a lot
12 of the dioxins and furans?

13 A. Yes.

14 Q. Do you recall that evidence?

15 A. Yes.

16 Q. When he said high temperature, what
17 type of number are we talking about here, something in
18 the range of 1700 degrees Fahrenheit; is that the type
19 of number you are talking about?

20 A. I am afraid that was in Celsius
21 yesterday.

22 Q. I am sorry.

23 DR. EFFER: A. I think the answer to the
24 interrogatory that was tabled this morning, that I
25 asked to have tabled to Mr. Campbell gives this

1 information.

2 Q. All right.

3 MR. BURPEE: A. Anyway, 900 degrees C is
4 what I recall; that is Celsius.

5 Q. 900 degrees C is the type of
6 temperature you need to burn off dioxins and furans?

7 A. Yes.

8 Q. Maybe not all of them, but certainly
9 a lot of the.

10 But am I correct that if you burn hot,
11 like, at those temperatures, first of all, you increase
12 the cost of generation because you are burning more
13 fuel?

14 A. Well, the process won't work without
15 running at those high temperatures. We need the high
16 temperatures to get the appropriate steam temperatures
17 and pressures.

18 Q. And when you burn hot like that,
19 don't you increase the carbon emissions?

20 A. I don't follow, carbon in what form?

21 Q. Well, carbon dioxide emissions.

22 A. Carbon dioxide, I don't know.

23 MR. DAWSON: A. No. If you burn at low
24 temperatures, you will have unburned carbon emissions
25 and that is inefficient combustion.

1 Q. All right. When you burn hot, do you
2 increase emissions of any other?

3 A. The higher the flame temperature, the
4 higher the nitrogen oxide emissions, as I discussed in
5 my direct evidence.

6 Q. That's right. And that is why, Dr.
7 Effer, you said you were looking into burning or there
8 was some move to look into burning at lower
9 temperatures?

10 A. I think I --

11 Q. I am sorry, Mr. Dawson.

12 A. I think I may have said that if we
13 convert to combustion process modified boilers with low
14 NOx burners on there, then the whole objective of that
15 is to reduce flame temperatures, but you are still
16 looking at temperatures that are well above 1700
17 degrees.

18 Q. All right. Dr. Effer, do you know
19 when they did these tests at Lambton, Lakeview and
20 Nanticoke what temperatures they were burning at that
21 time?

22 A. The flame temperatures were up in the
23 range, 2300 to 2600 degrees Fahrenheit.

24 Q. Now, just at the bottom of this
25 interrogatory, it indicates that the continuous

1 emission monitoring in the six main facilities will be
2 in-service on January 1, '92; is that equipment
3 in-service?

4 A. I can't tell you precisely whether it
5 is in-service.

6 MR. BURPEE: A. A good deal of it has
7 been in-service, but there has been continual problems
8 with the operability of the equipment as installed.
9 And I believe we went back to the Ministry of
10 Environment and got an exemption on actual in-service
11 date in terms of reliable information. I can't recall
12 right now whether it is 12 months or 18 months, but
13 there has been significant problems with equipment that
14 was purchased and getting it to operate on a reliable
15 basis.

16 Q. All right.

17 THE CHAIRMAN: It is at least 12 months?

18 MR. BURPEE: I believe so, but I just
19 came across something a month or so ago on that.

20 THE CHAIRMAN: So, it will be no earlier
21 than January 1, '93, then?

22 MR. BURPEE: I believe that is the case.

23 MR. STARKMAN: Q. Now, Mr. Burpee, just
24 so I am clear, so the continuous stack monitoring
25 equipment is not in place at any of the Hydro's

1 facilities.

2 MR. BURPEE: A. It is in place, it has
3 been installed, but they are having problems with it
4 operating on a continuous basis.

5 I believe we have told the Ministry of
6 the Environment that it will be giving reliable
7 information 95 per cent of the time that the boiler is
8 in operation and we cannot achieve that 95 per cent
9 level at this time that and that is what is going to
10 take longer to sort out problems with pumps and
11 whatnot, analyzers.

12 Q. So it is installed but it is not
13 in-service?

14 A. I don't know how much is in-service
15 and how much is not, but it certainly is not at
16 reliability level that was required.

17 In terms of the stack testing, we have
18 told you some of the dates, the detail of stack
19 testing. There has been a fair amount of other
20 analysis of flue gases but not looking for dioxins and
21 furans per say but more looking at NOx, SO(2) and
22 carbon monoxide in terms of optimizing boiler
23 performance. And each boiler might have that type of
24 test every two years or something like that depending
25 on the coals you are burning or changing.

1 So there is some analysis of emissions
2 but not to the detailed level of the trace metals or
3 dioxins and furans.

4 Q. Dr. Effer, I am still trying to talk
5 about the health impact studies. I believe you told
6 Mr. Campbell that Hydro used the methodology basically
7 from California or the EPA to conduct its studies?

8 DR. EFFER: A. Yes.

9 Q. All right. I take it the information
10 that you used was the Lambton information?

11 [10:55 a.m.]

12 A. We based the methods of doing things
13 on the actual measurements that we were able to get at
14 Lambton, yes.

15 Q. In '86?

16 A. It was based on actual emissions from
17 Lambton, yes.

18 Q. From 1986?

19 A. Yes.

20 Q. Wouldn't you agree with me that it is
21 very difficult to extrapolate from that site to the
22 type of emissions or emission effects that might be
23 found at other Hydro facilities across the province?

24 A. I think the term "extrapolate" needs
25 to be...

1 I would like to say that I think the
2 methodology is readily applicable to other sites.
3 Certainly we can't reproduce the meteorology or the
4 population distribution. We would have to get, for
5 example, those two pieces of information, from the
6 specific site we would be studying.

7 Q. Well, I had a short list that I
8 wanted to ask you about with the problems about
9 extrapolation, and they were on it. I mean, one of the
10 factors that it is necessary to consider is the
11 meteorology, particularly wind speed and wind
12 direction; you would agree with that?

13 A. Yes. We don't claim that this data
14 is applicable directly to other sites.

15 Q. All right. Well, I will come back to
16 the conclusion. Let me just see what it is that
17 differentiates, the factors that differentiate one site
18 from another. Wind speed and wind direction--

19 A. Yes.

20 Q. --definitely are factors? I take it
21 that another factor would be inversions or other
22 meteorological phenomenon?

23 A. Yes.

24 Q. Inversions are one of the things that
25 someone mentioned that there was an order from the

1 Ministry of the Environment with respect to the
2 operation of certain facilities in certain
3 meteorological conditions?

4 A. Yes. This is characteristic of
5 lakeshore sites, and Lakeview we have mentioned as
6 being under that. There is a specific meteorology
7 associated with lakeshore sites which would have to be
8 taken into account which is not so readily obtainable
9 to Lambton.

10 Q. Yes. So that it is perhaps clear, if
11 a site has a particular number of inversions or
12 severity of inversions this could affect the point of
13 impingement measurements as to even whether you are
14 meeting the regulation or not?

15 A. Yes.

16 Q. All right. I take it another factor
17 is the stack height?

18 A. Yes.

19 Q. And that if you have a higher stack
20 generally speaking you spread the emissions further so
21 that at the point of impingement the impact is already
22 going to be less and therefore it might meet the
23 regulation?

24 A. Yes. Given other things being equal,
25 the stack height would mean that the maximum point of

1 impingement would be further away, and it would be
2 smaller.

3 Q. Depending on the location of the
4 plant and the population?

5 A. No, that would purely be a function
6 of the stack height and with other things being equal.

7 Q. All right. Now, do you know, can you
8 tell us what the various stack heights are at the
9 various plants in operation. Is that something that --
10 Mr. Burpee, is this something that you would know?

11 A. Nanticoke is about 650 feet, isn't
12 it?

13 MR. BURPEE: A. Yes.

14 DR. EFFER: A. Lennox is about...?

15 MR. BURPEE: A. It would be about the
16 same.

17 MR. DAWSON: A. Lambton is about the
18 same, I think.

19 MR. BURPEE: A. Lakeview is 495 feet,
20 that I know.

21 DR. EFFER: A. Atikokan is much smaller.
22 It is less than about 400 now, I think.

23 MS. PATTERSON: I can't hear this. Could
24 we go through them in order?

25 MR. BURPEE: Atikokan is about 400 feet.

1 I think Thunder Bay is in the neighbourhood of 600 or
2 650.

3 Lambton? Well, I don't think it is as
4 high as 650. I thought it was lower than Lambton, but
5 anywhere from 500 to 600 feet.

6 I think we have Nanticoke at 600. Lennox
7 is about 600. The Hearn's is 800. And 495 at
8 Lakeview, that one I know.

9 THE CHAIRMAN: I didn't hear the last
10 one.

11 MR. BURPEE: Lakeview is 495 feet.

12 MR. STARKMAN: Q. Dr. Effer, can you
13 think of any other major factors that would make the
14 transference of the Lambton results difficult or
15 perhaps not appropriate to other sites?

16 DR. EFFER: A. Well, in the modelling
17 that is used for dispersion of the stack gases, I think
18 two important matters are the temperature of the stack
19 gases - that will increase the buoyancy - and also the
20 actual velocity that the stack gases are emitted at.

21 Those two together will increase what we
22 call the effective stack height, which means that the--

23 Q. The plume?

24 A. --the plume rises and then comes
25 under the influence of wind.

1 Q. Those factors, is that a function of
2 how hot it is burning, or what influences those
3 factors?

4 A. It is a function of the boiler
5 temperature and also the fans. Maybe Mr. Dawson can
6 give you more detail.

7 MR. DAWSON: A. Well, it is a function
8 of the energy recovery from the boilers, so it is a
9 function of what heat is left in the gas after you have
10 generated all the steam that you are going to generate
11 out of the boiler.

12 Q. I take it that varies from plant to
13 plant?

14 A. Not by very much, though, in our
15 designs. It is a function of the sulphur content in
16 the fuel because that dictates the acid dew point and
17 that dictates the temperature which you cannot go below
18 because if you do, you are going to experience severe
19 corrosion in all the flue gas duct work.

20 Q. Thank you. The only question I
21 wanted to ask about the methodology, Dr. Effer - and
22 maybe this is just putting it in lay terms - but does
23 the methodology assume a threshold level or what I
24 would call a linear dose response relationship?

25 DR. EFFER: A. For both individual and

1 population dose estimates we arrived at that provides a
2 number which lies on a continuum by which we would
3 compare that number with risk.

4 Q. So is the answer that it assumes a
5 linear dose response relationship from running through
6 zero so that the more exposure the worse it is,
7 although you measure that off against a risk
8 assessment?

9 A. The number which we have arrived at,
10 the maximum individual dose and the population dose, is
11 in turn a function of concentration, and in that sense
12 the concentration experienced by an individual or a
13 population, the more that goes up the bigger the dose.
14 So yes, I am coming around to saying "yes", in that
15 respect it is a linear relationship.

16 Q. All right. Dr. Effer, you agreed
17 with Mr. Campbell that it would be possible to quantify
18 the cost, if you like, of hospital admissions, doctors
19 visits, and so forth, or at least hospital admissions
20 and doctors visits, I mean. Has Hydro quantified those
21 costs?

22 A. Well, for one of our studies that was
23 submitted or one report that was submitted for the
24 National Energy Board license we did relate emissions
25 to the effects being increased hospital admissions and

1 related that, and we did have a cost attached to that,
2 which is what was required by virtue of the application
3 to the National Energy Board.

4 Q. Yes. Dr. Effer, I intended to come
5 to the National Energy Board filing in some detail.
6 There is a total number given there. Do you recall in
7 that report whether it is broken down by hospital
8 admissions, doctors visits, medication, and so on, in
9 that type of detail?

10 A. I am not aware of the detail which
11 constituted that figure.

12 Q. All right. Are you aware of the
13 number? Why don't we just look at the part that I have
14 extracted. It is in our background material, Exhibit
15 486, and I think it starts at page 6. The pages are
16 numbered at the bottom. It is page 6 of Exhibit 486.

17 All I have done here, I have reproduced
18 the Executive Summary page from volume 4 of the filing
19 with the National Energy Board, which is October --

20 THE CHAIRMAN: Just hold it a second now.
21 This is the Executive Summary of the National Energy
22 Board filing by Hydro; is that right?

23 MR. STARKMAN: That is correct, Mr.
24 Chairman.

25 I think it is identified on page 6 of the

1 exhibit. It is the Summary Report on the Social Cost
2 of Emissions from Ontario Hydro Fossil-Fired and
3 Nuclear Generating Stations that are Attributable to
4 Projected Electrical Exports, and the filing was in
5 August, I guess, 1990, with the National Energy Board.

6 Just on this, I don't recall, I looked to
7 see if the entire filing has been marked as an exhibit
8 in these proceedings, and I couldn't locate it on my
9 exhibit list, and I don't know if counsel for Hydro has
10 an understanding of this matter.

11 MR. HOWARD: Well, I don't think the
12 whole thing has been filed, Mr. Chairman. There are
13 six or seven volumes, and I think some parts of it have
14 been filed from time to time, but we can give you a
15 list.

16 THE CHAIRMAN: This looks like it was a
17 separate report, a summary report on the social costs
18 of emissions.

19 MR. STARKMAN: Mr. Chairman, I know just
20 holding it up doesn't do, but this is volume 4. For
21 the purposes of this question I extracted the Executive
22 Summary in its entirety, but the rest of the volume
23 essentially provides the background information for the
24 Executive Summary.

25 MR. HOWARD: I remember objecting to the

1 whole thing going in at some stage of the exercise, but
2 we will give you a list, and my recollection is that
3 this particular volume probably is marked. But we will
4 check that and let you know.

5 MR. STARKMAN: Mr. Chairman, if it hasn't
6 been marked I would seek to have it marked as an
7 exhibit in its entirety.

8 THE CHAIRMAN: The whole thing?

9 MR. STARKMAN: Which is volume 4 at this
10 point. I mean, like I say, I think there are seven
11 volumes to the filing.

12 MR. HOWARD: Well, I guess we can make
13 copies, but we are just filling up shelf space which is
14 totally irrelevant to the begin with, as is plain on
15 the face of this document.

16 The analysis is the incremental effect of
17 the exports, and I thought that during Panel 3 there
18 was some discussion that took place as to its relevance
19 because of the fact that it was looking only to the
20 incremental effect of exports, which lessened the
21 difficulty perhaps but also lessened the relevance to
22 what is before this Board.

23 We will find what is listed, and if my
24 friend wants the whole thing he obviously has the whole
25 thing or can get it from the NEB. I have forgotten

1 how --

2 THE CHAIRMAN: We are really just
3 concerned about the quantification of health costs.
4 That is what we are talking about, and that was a
5 subject that Mr. Campbell raised and now is being
6 raised by Mr. Starkman, and there have been some,
7 apparently, studies done by Hydro of health experience,
8 and that is what you would like to explore; is that
9 right?

10 MR. STARKMAN: That is correct.

11 THE CHAIRMAN: And to that extent, if
12 that can be extracted, that part can be extracted out
13 in any convenient way that would be, I think, useful.

14 MR. HOWARD: The studies were not done by
15 Hydro but were done by consultants.

16 THE CHAIRMAN: I'm sorry, they were done
17 for Hydro by consultants?

18 MR. HOWARD: Seven. At great expense.

19 THE CHAIRMAN: Well, this will reduce the
20 marginal cost, then. [Laughter]

21 Where are we at?

22 MR. STARKMAN: Q. I think, Dr. Effer, I
23 had asked whether or not you said that it was possible
24 to monetize or quantify health admissions or hospital
25 admission costs, and I asked you if Hydro had done

1 that. And you said you think that something like that
2 was done in the filing with the NEB; right?

3 DR. EFFER: A. Right.

4 Q. All right. Now, can we just look at
5 this and just so I can understand what Hydro was saying
6 to the NEB? I appreciate your counsel's point that
7 Hydro didn't do it, but you had consultants do it and
8 you adopted it and filed it with the NEB. Am I correct
9 in that?

10 A. Yes, it is our report.

11 Q. It is your report. All right. Can
12 we just look here at the Executive Summary and find the
13 discussion about the hospital admissions?

14 I am on page 7 of Exhibit 486, and I am
15 in the third paragraph. It says:

16 The increased incidence of
17 respiratory illnesses attributable to
18 export-related emissions of sulphur and
19 nitrogen oxides for each year of the
20 projected export period is forecast to be
21 155 to 401 hospital admissions, 1,149 to
22 2,906 hospital days, and 5.5 to 13.8
23 shortened lives predicted premature
24 mortality attributable to reduced air
25 quality resulting from the exports. The

1 increased incidence of cancer occurrence
2 due to export-related emissions of metals
3 is forecast to be 0.43 to 0.80 cases per
4 year.

5 Now, the first -- sorry?

6 A. I don't have a question, do I?

7 Q. No. The question is, if you go to
8 the next page, which is 8, and there is that indented
9 part with the numbers beside it in about around the
10 middle of the page, it says:

11 The derived social costs can be
12 expressed by cost per unit of electrical
13 generation for export.

14 And then it has, human health-fossil, and says,
15 basically, most likely value, 2.88.

16 And I take it that is mills per
17 kilowatthour of exports?

18 A. Correct.

19 Q. All right. Now, I had a number of
20 questions about this. First of all, is there an easy
21 way to translate mills per kilowatthour into cents or
22 some other, something else that we have been talking
23 about, more commonly?

24 MR. DAWSON: A. Just divide by 10.
25 .288 cents per kilowatthour.

1 Q. Okay. Now, the second point that is
2 made in here and which your counsel mentioned is that
3 this is related to an export application, and it says:

4 The derived social cost can be
5 expressed as cost per unit of electrical
6 generation for export.

7 I am just wondering sort of methodologically how you
8 derived off the cost for export from other costs which
9 weren't included. What is the method by which that was
10 done?

11 DR. EFFER: A. We know how much
12 electricity we have exported.

13 Q. Could you speak up a little bit? I'm
14 sorry.

15 A. We know how much electricity is
16 exported, and we know how it relates to the overall
17 electricity output of the stations.

18 And I believe this applies to Lakeview
19 and Nanticoke only, is it?

20 MR. DAWSON: A. No, it includes Lambton.

21 DR. EFFER: A. Lambton as well. By a
22 proportion, we can arrive at these figures by an
23 algorithm which was prepared by Ontario Hydro.

24 [11:13 a.m.]

25 Q. I am looking here at the asterisk at

1 the bottom of the page which says:

2 This value assumes total system annual
3 fossil energy production ranging from 23
4 to 25 terawatthours with 8 terawatthours
5 of fossil export, total system annual
6 nuclear energy production, et cetera.

7 Now, if we are just looking at the .28
8 cents per kilowatthour for the human health fossil, I
9 mean, is it too simplistic to say 8 terawatthours of 23
10 to 25 -- excuse me. The .28 relates to the 8
11 terawatthours of export, but there was a total of 23 to
12 25, so it is roughly a third. It is in the range of a
13 third of the generation is for export.

14 Is that too simplistic a way to look at
15 this? It is just at these numbers.

16 A. That is the ratio of total to
17 exported from fossil stations, yes.

18 Q. All right. So, therefore, just using
19 these numbers, if you were going from human health to
20 fossil cents per kilowatthour for the three plants -
21 Lakeview, Lambton and Nanticoke - you would multiply by
22 three?

23 MR. MEEHAN: A. No, I don't think you
24 can do that. I think it is expressed in dollars or
25 cents per kilowatthour, so if you want to do the very

1 simplistic thing you are wanting to do, you would
2 arrive at, you could - I am not saying it is correct -
3 but you could arrive at a cost of 2.8 cents per
4 kilowatthour for perhaps all 23 or 25 gigawatthours or
5 terawatthours.

6 Q. How would do you that, Mr. Meehan?

7 A. Well, I think the way you are wanting
8 to do it.

9 Q. I see, okay.

10 A. That would be a very simplistic way.
11 I don't know whether the 2.8 would, in fact, apply to
12 anything but the 8 terawatthours. The only point I am
13 trying to make is that because it is already expressed
14 in cents per kilowatthour, you can't multiply it by
15 three in order to get the total cost and still have it
16 expressed in cents per kilowatthour.

17 Q. Okay. Mr. Dawson, did you want to
18 comment?

19 MR. DAWSON: A. I think the other point
20 to bear in mind is that what you are looking at is
21 incremental increases in concentrations of SO(2) and
22 nitrogen oxides in an area as a result of that 8
23 terawatthours of generation if you didn't, and those
24 levels are representative of the total of the 23 to 25
25 terawatthours, if you didn't produce the 8

1 terawatthours, then the concentrations would be less
2 and the health effects would be less.

3 So, it is an incremental cost for the
4 last increment of SO(2) emissions and nitrogen oxide
5 emissions representative of that incremental 8
6 terawatthours over and above the base generation.

7 Q. All right. Dr. Effer, could you tell
8 us how the human health fossil, the .288 was or the
9 2.88 mills per kilowatthour, how it was generated;
10 where does it come from?

11 A. The emissions were related to air
12 pollution levels and the air pollution levels to
13 recorded hospital admissions, hospital days, shortened
14 lives and premature mortality. That was a direct
15 relationship used for this calculation. And based on
16 that simple relationship, the costs were acquired from
17 the hospitals as to the -- and those hospital days, et
18 cetera, that were used related to costs by reference to
19 hospital costs.

20 Q. All right. But with respect to the
21 hospital admissions, you are talking here about
22 respiratory illnesses?

23 A. I am talking to what is on the third
24 paragraph of the executive summary - the hospital
25 admissions, hospital days, shortened lives, premature

1 mortality.

2 Q. Okay. What number was used for the
3 shortened lives, premature mortality?

4 A. I don't have knowledge of that
5 breakdown.

6 Q. Can you provide that to me?

7 MR. HOWARD: Mr. Chairman, in the interim
8 of great research, I find that there is at least an
9 excerpt from volume 4 already marked as Exhibit 215.

10 I have a recollection that there was an
11 undertaking with respect to volume 4 of the NEB
12 submission and we can check that at the break, but if
13 it is already in the record, we don't want another
14 undertaking.

15 THE CHAIRMAN: All right. Well, perhaps
16 we can check it at the break.

17 MR. STARKMAN: I will come back to that
18 question.

19 Q. Dr. Effer, is it your understanding
20 that in deriving the 2.88 number other than the matters
21 mentioned in -- that there were any other matters
22 included in that other than those mentioned in the
23 third paragraph on page 7?

24 THE CHAIRMAN: Well, maybe it would be
25 good to have a look at Exhibit 215 and that might

1 answer that question, too.

2 MR. STARKMAN: We will look at that.

3 THE CHAIRMAN: I take it 215 isn't
4 readily available at the moment.

5 MR. HOWARD: I don't think we have one
6 readily available in the room, but we have one on the
7 floor and we will get it at the break.

8 MR. STARKMAN: Perhaps I will come back
9 to these questions after the break, when we can look at
10 that exhibit.

11 Q. I wanted to move on to talk about the
12 life extension of the plant. I know that this matter
13 has been touched on previously, so I don't intend to
14 try and repeat that, but I just wanted to understand
15 that when I was asking Mr. Taborek about life
16 extensions -- I don't know who these questions are for;
17 is it Mr. Meehan, Mr. Burpee?

18 When I was asking Mr. Taborek about the
19 40 years --

20 THE CHAIRMAN: I suppose we should
21 preface this, that this panel has already said that the
22 evidence given with respect to life extensions in Panel
23 2 should be disregarded, I think is the word that was
24 used. That, of course, as I pointed out, isn't quite
25 as simple as that because I think it is still the

1 evidence of Mr. Taborek and the others of Panel 2 and
2 that is to be given whatever weight that we consider to
3 be appropriate, but perhaps you are aware of that, Mr.
4 Starkman.

5 MR. STARKMAN: I am aware of that, Mr.
6 Chairman.

7 THE CHAIRMAN: All right.

8 MR. STARKMAN: Q. My point is really
9 this: That as I understand the situation now, or at
10 least, after Panel 2, Hydro was saying you should count
11 on a 40-year average for fossil plants.

12 I am just wondering, Mr. Meehan, and I
13 have read your evidence given previously, and I am
14 taking into account that this is a planning hearing,
15 what should this panel rely on as being the average for
16 planning purposes for fossil plants?

17 MR. MEEHAN: A. I think I have said
18 before that the life, the average life that should be
19 used for all stations except Lambton and Nanticoke
20 should be 40 years, and that we are trying to come to
21 grips right now with what the life for Lambton and
22 Nanticoke might be; but for planning purposes, we are
23 assuming that it is beyond the year 2014 and for
24 planning purposes as well as, we have also assumed that
25 it is ten years or more.

1 Q. All right. And why have you taken
2 out Lambton? And why do you say assume 40 years for
3 the other plants except for Nanticoke and Lambton?

4 A. There are some stations that we just
5 haven't been able, I guess, to make that kind of an
6 assumption for.

7 I think when we have a harder look at
8 Lennox, which is our newest large unit station, we
9 could very well come to the decision that Lennox would
10 also be life extended, but we just don't have that much
11 information on it. And right now, Lennox with a
12 40-year life doesn't retire within the 2014 period. I
13 believe the average date for Lennox is 2015 or
14 something.

15 Q. All right. And what do you say about
16 Lakeview?

17 A. Lakeview. I think we have always had
18 the concern at Lakeview that the costs of fitting
19 environmental controls on that particular site would be
20 excessive and that it would likely not be economic to
21 life-extend Lakeview. Lakeview is a very small site.

22 Q. What do you say about Nanticoke and
23 Thunder Bay?

24 A. Nanticoke we are going to life
25 extend.

1 THE CHAIRMAN: You mean Atikokan?

2 MR. STARKMAN: Q. Atikokan, I am sorry.

3 MR. MEEHAN: A. They are small stations,
4 small units that may become uneconomic in the
5 long-term. We haven't really looked at them in depth.

6 Q. All right. Mr. Meehan, I think I
7 understand what you are saying. I mean, the problem
8 that I am having is that this is a planning hearing and
9 what you are saying is, well, we have taken a close
10 look at Lambton and Nanticoke and we think that they
11 should be beyond 40 years, at least ten years beyond,
12 maybe to longer. With respect to the others, you
13 should assume 40 years, in part because we haven't
14 really had a chance to take a close look at them and
15 when we do, we may extend their life or we may not,
16 depending on the economics and whatever other factors
17 are relevant at the time.

18 A. Yes, that is what I am saying.

19 Q. All right. And so, that is the best
20 you can do to help us out with the planning of this --

21 A. At this point in time. I think
22 Thunder Bay though and Atikokan would both retire
23 normally with a 40-year life. They are retiring
24 outside the 2014 year period as well. I believe that
25 is the case. I know it is the case for Atikokan and I

1 think it is the case for Thunder Bay as well, for the
2 two new units at Thunder Bay.

3 MR. SHALABY: A. If I can add a personal
4 note: I am a great fan today of life after 40. Today
5 I turned 40, so I am really interested in life
6 extension and the prospects of life after 40.

7 [Laughter]

8 THE CHAIRMAN: I think on that happy
9 note, perhaps we will take the break and we can regroup
10 in another 15 minutes.

11 THE REGISTRAR: This hearing will recess
12 for 15 minutes.

13 ---Recess at 11:26 a.m.

14 ---On resuming at 11:47 p.m.

15 THE REGISTRAR: Please come to order.
16 This hearing is again in session. Be seated, please.

17 MR. HOWARD: Mr. Chairman, Exhibit 215
18 turned out to be a red herring because it was an even
19 shorter extract from volume 4. But during the break we
20 also found that extensive extracts from volume 4 of the
21 submission to the NEB were introduced as Exhibit 241,
22 tab 2, on July the 15th in Volume 44 of the transcript.
23 And at page 7916 of that transcript, Mr. Snelson
24 advises that volumes 4, 5 and 6 are something like
25 eight inches of documents. We have looked at 241 and

1 it contains extensive extracts, in the order of 50
2 pages from volume 4 of the filing with the NEB.

3 I don't know what my friend wants. He
4 suggested that he might look at that exhibit and see
5 whether that is enough for his purposes before we bring
6 in the whole thing, if that is satisfactory.

7 MR. STARKMAN: What I said, Mr. Howard,
8 was that we should go over the matters that have
9 already been filed and if there were additional
10 portions of volume 4 that we thought should be filed,
11 then we would subsequently file them, but we would not
12 reproduce materials that were already marked as an
13 exhibit in this hearing.

14 MR. HOWARD: That is certainly
15 satisfactory to me if it is satisfactory to the Board.

16 THE CHAIRMAN: That is fine.
17 ---Off the record discussion.

18 THE CHAIRMAN: Mr. Starkman?

19 MR. STARKMAN: Thank you, Mr. Chairman.

20 Q. Dr. Effer, I would like to just
21 return to the matter we were discussing before, which
22 is the NEB filings and the health costs and so forth.
23 And I think I had asked before whether or not you could
24 provide us with the number that Hydro used in preparing
25 the NEB filings for premature death, premature

1 mortality as it is called in the report, and you said
2 you didn't know, but could you provide that to me?

3 DR. EFFER: A. These data will be
4 available in the report and they can be made available
5 and we can do that.

6 Q. Okay. So the answer is, it is
7 somewhere in volume 4, the answer to my question,
8 volume 4 being of the NEB filing.

9 A. I don't know precisely what volume it
10 is in. We will undertake to provide that information.

11 Q. Okay. Thank you.

12 THE CHAIRMAN: Number?

13 THE REGISTRAR: 478.17.

14 ---UNDERTAKING NO. 478.17: Ontario Hydro undertakes to
15 provide the number that Hydro used in
16 preparing the NEB filings for premature
death or "premature mortality".

17 MR. STARKMAN: Q. Now, Dr. Effer, just
18 sticking with the health costs, I think we have all
19 looked at third paragraph which is on page 7 of Exhibit
20 486 or the third paragraph of the executive summary.

21 I am just wondering if there are other
22 costs, health effect costs, which might have been
23 quantified which weren't. I am thinking here about
24 things like respiratory diseases or skin ailments which
25 occasioned a visit to a physician but not a hospital

1 admission.

2 DR. EFFER: A. That example seems to be
3 the one doesn't seem to be included in that listing of
4 the report, so that I agree that that would be an
5 incurred cost.

6 Q. Does Hydro have any evidence about
7 the frequency of that occurrence or any numbers that
8 might be attributable to it?

9 A. I can't speak for the details that
10 went into this study, I am sorry, they may or may not.

11 Q. Could you make inquiries and
12 determine whether or not Hydro has numbers that might
13 be attributable to the occurrences I have described,
14 and if so, provide them to me?

15 A. Yes.

16 Q. Thank you.

17 THE CHAIRMAN: Perhaps that can be just
18 included in No. 478.17; would that be satisfactory?

19 MR. STARKMAN: That would be fine.

20 Q. The other area which occurs to me is
21 people who have either have a respiratory problem or
22 skin problem or some other problem which they don't --
23 there is no hospital admission and there is also no
24 visits to a doctor but it does result in some form of
25 life disruption, irritation, perhaps lost time from

1 work or something else.

2 Now, has Hydro made any effort to
3 quantify those types of occurrences?

4 DR. EFFER: A. I am not aware that those
5 costs were included in this report.

6 Q. Okay. Well, in part of the same --
7 under the same undertaking, could you make those
8 inquiries as well and if there is not information,
9 could you just advise that Hydro did not or does not
10 have any information in that respect?

11 A. Yes.

12 [11:55 a.m.]

13 Q. Dr. Effer, is there some reason why
14 the type of analysis that was carried out for the NEB
15 filing that we have been looking at here, at least in
16 the Executive Summary, was not done for this hearing or
17 was not done for the existing system?

18 MR. SHALABY: A. I think we discussed
19 that in Panel 3 to some extent. The reason we did it
20 for the NEB, it was a requirement of the NEB for an
21 export license.

22 Q. No, I am aware of that. So is the
23 whole answer, it was a requirement of the NEB but you
24 didn't feel that it was a requirement for this hearing?
25 Is that the answer?

1 A. Well, the studies have a lot of
2 limitations, a lot of approximations made into them,
3 and those were the reasons we discussed in Panel 3, to
4 my recollection.

5 Q. But I take it with that answer it
6 would be possible for you to carry out such a study for
7 the existing system?

8 A. The answer is probably "yes", it
9 could be done. What we have carried out in volume 4 or
10 Exhibit 4 is a lot of discussion of health effects and
11 environmental effects, not quantified to that extent
12 but displayed all the emissions and all the impacts.

13 Q. But I guess my specific question was,
14 it would be possible - I take it the answer would be
15 "yes" - to monetize and make an effort at monetizing
16 the costs of the emissions for the existing system, if
17 you wanted to?

18 A. Provided it has a lot of limitations.

19 Q. Yes.

20 A. One would question making a big
21 effort if he knows the extent of limitations there are
22 on the validity of results.

23 Q. Now, Dr. Effer, I think just before
24 the break, Dr. Dawson, when we were discussing the .28
25 and whether it would be applicable just in itself to

1 the existing system, made the point that the
2 incremental values might be different than the average.

3 What I wanted to ask you was, do you have
4 any evidence to suggest that the incremental value
5 would be different from the average for the costs that
6 are set out in the Executive Summary.

7 DR. EFFER: A. The question, again it is
8 along the lines of linearity, and we assume that there
9 is a linear relationship here between emissions and the
10 costs.

11 Q. I wanted to move on, still looking at
12 the same exhibit, to talk about the analysis of
13 terrestrial ecosystems, fossil. I am on page 8 of
14 Exhibit 486. There is a number of .06 mills per
15 kilowatthour. Do you see where I am reading?

16 A. Yes.

17 Q. And then if you go back to the
18 previous page where it is being discussed, at least in
19 the Executive Summary, it says:

20 No impact on vegetation from
21 export-related emissions of SO(2), SO(4),
22 NOx acidic deposition trace elements and
23 particulate matter is forecast. Ozone
24 adversely affects crops and forests and a
25 reduced crop yield due to ozone derived

1 from the production of export-related NOx
2 is forecast.

3 A. Yes, I see that.

4 Q. So I take it that you agree, and it
5 is your evidence that there is no impact on vegetation
6 from the export-related emissions? Would you agree
7 with that statement?

8 A. I don't have sufficient information,
9 knowledge of the methods that were used to agree or
10 disagree with that statement.

11 Q. What about with respect to the
12 existing system? Is it Hydro's evidence or your
13 evidence that there is no impact on vegetation from
14 emissions of SO(2), SO(4), and NOx acidic depositions?

15 A. I would not say there is no effect.
16 I think the primary impact on vegetation is, as the
17 report says and as my direct evidence has said, is
18 through the production of ozone, which is a product of
19 nitrogen oxide emissions, and it is a very tenuous
20 exercise to relate nitrogen oxide emissions to ozone
21 production. So we do know that even though nitrogen
22 oxides do contribute to ozone we haven't got a firm
23 figure of how that emission-produced ozone indirectly
24 affects and causes crop damage or other --

25 THE CHAIRMAN: I'm sorry, I don't hear

1 the last part of that.

2 DR. EFFER: Causes vegetation damage.

3 MR. STARKMAN: Q. In terms of the
4 impact, then, what would you say the impacts are? I
5 mean, I know you have said there are impacts and it
6 causes vegetation damage. Can you be more specific?
7 What are the impacts of these sorts of emissions on
8 vegetation?

9 DR. EFFER: A. Sulphur dioxide above
10 certain levels produces damage to leaves, causes
11 breakdown of the chlorophyll, causes chlorosis. It
12 also can contribute in upper concentrations to actual
13 stunting and death of vegetation. These are of course
14 at very much higher levels than experienced around
15 generating stations.

16 The nitrogen oxides are not considered in
17 themselves to be highly toxic to vegetation, but, as I
18 just said, the nitrogen oxide-mediated production of
19 ozone is -- the ozone is damaging to vegetation. That
20 produces lesions on leaves or plants, and, as my direct
21 evidence says, there is a lot of huge literature on
22 this subject.

23 Q. I guess maybe my question should have
24 been more specific. I didn't mean what damage might be
25 caused; I meant, from your point of view what damage is

1 caused by Hydro's emissions?

2 A. The ground level concentrations which
3 we know exist around our stations is not sufficiently
4 high to cause visible damage to vegetation.

5 Q. So it is your position that the
6 SO(2), SO(4) and NOx emissions from the existing
7 stations cause no damage to vegetation in and around
8 existing facilities?

9 A. That's what I said, no known visible
10 damage to vegetation.

11 Q. What about damage to forests and
12 crops?

13 A. Again, no known damage attributable
14 directly to our emissions.

15 Q. Now, if there is no known damage, in
16 this exhibit they estimate it at .06 mills per
17 kilowatthour. Do you know where that number came from?
18 That's for the export component.

19 A. The subject of ozone is brought up in
20 the paragraph three from the bottom on page 7, and that
21 may be - I am not saying it is - may be the factor
22 which is producing that cost figure.

23 Q. Do you know how the number was
24 derived?

25 A. There are some very clearly defined

1 concentration/effect relationships in the literature
2 and --

3 Q. I am talking about the .06.

4 A. I can't say in detail how it was
5 arrived at, no.

6 As I say, the costs to given plants and
7 crops, reduction of growth rate and things, can be
8 readily quantified in costs of growth reduction, and
9 that has been used in a number of exercises to measure
10 the effects, the damage function of emissions.

11 Q. I understand that, but I guess I was
12 asking how they converted those effects to a dollar
13 figure or to a cents per kilowatthour figure.

14 A. I can't speak for the specific way of
15 doing it in this report.

16 Q. If you have further information could
17 you advise me of how you did that conversion?

18 MR. HOWARD: Well, Mr. Chairman, if my
19 friend is going to ask how it was done in the report it
20 clearly must be explained in the report how it was
21 done.

22 I haven't had a chance to look at what is
23 filed, but I do know that it has more qualifications on
24 it that Mr. Shalaby expressed from the evidence given
25 in Panel 3 and from the third full paragraph on page 8

1 of my friend's extract: considered approximations,
2 numerous uncertainties, placed broad confidence limits
3 on the social cost figures presented by the
4 consultants.

5 There are seven consultant studies that
6 all explain how they do it. The one I remember is that
7 the building materials number was somebody's guess as
8 to how often, how many more oftentimes you would have
9 to paint your house as a result of the emissions
10 related to the exports.

11 Now, that may be useful to the NEB, but
12 with great respect it seems to me that we are getting
13 into minutiae which are not terribly relevant.

14 MR. STARKMAN: Mr. Chairman, I am willing
15 to pass on this, but I just want Hydro to know that a
16 good part of the Coalition's case is on the question of
17 monetizing externalities, whether they should be
18 monetized, and if so how do you it and what the numbers
19 should be.

20 Now, here we have an example, together
21 with all of the caveats, that Hydro because they were
22 required to do so made an effort to monetize the
23 externalities in these circumstances, subject to all
24 the constraints.

25 If they don't feel it is necessary to

1 provide any further comment on how they did it - I am
2 talking about arrive at the number - translate reduced
3 crops or lesions on crops into a number, small as it
4 might be, if they don't want to do that, then that's
5 fine.

6 But they should know that it will be our
7 evidence and a large part of our evidence will be
8 related to the methodology for doing that very thing.

9 MR. HOWARD: I shall look forward to that
10 evidence with great anticipation, and we will find out
11 how reliable it is and how costly it is to produce.

12 THE CHAIRMAN: Well, then, I think I get
13 out of that that you are not asking for an undertaking
14 that this be produced.

15 All right. So we can just proceed on,
16 then?

17 MR. STARKMAN: That's fine.

18 Q. I would like to move on then to talk
19 a bit about plant life extensions and the types of
20 control devices that will be put on them.

21 I don't know. Mr. Meehan, is this your
22 area?

23 MR. MEEHAN: A. It will be me or Mr.
24 Burpee that will help with you it.

25 Q. Let me just ask you first, am I

1 correct that you said you were going to extend the life
2 of Lambton and Nanticoke. Can I just ask why it was
3 you chose those facilities over other ones for a life
4 extension or refurbishment purposes?

5 A. Because they have been the work
6 horses on the systems and we see that they will
7 continue to be the work horses on the system.

8 They comprise twelve 500 megawatt units,
9 and we only have four others, and they are located at
10 Lennox, to burn oil. So it is effectively the work
11 horses on the system today.

12 Q. So you chose them basically because
13 of their size?

14 A. Their size and the condition they are
15 in, et cetera, et cetera.

16 Q. The condition they are in, meaning
17 that they are in need of this sort of attention?

18 A. No, we expect that the technology
19 that is at those stations will be suitable for
20 continued operation through the extended period.

21 Q. Now, when you look at this question
22 of life extension and refurbishment did you look at
23 whether or not you should convert these stations from
24 coal burning to natural gas burning stations?

25 A. We have not looked at that in any

1 great detail at this point.

2 Q. Why haven't you looked at that?

3 A. There was no necessity to do that. I
4 have done some back-of-the-envelope calculations that
5 suggest that it would not be economic compared to what
6 it is we are doing.

7 Q. All right. Now, I do want to come
8 back to this "it would not be economic" because you
9 said that several times during the last week.

10 Can we look at page 34 of Exhibit 468,
11 which is the materials relating to environmental and
12 health effects of fossil generation. Page 34. Have
13 you got that, Mr. Meehan?

14 A. Yes, I have that.

15 Q. So am I right that in just looking at
16 this that if you converted it to a natural gas, either
17 of those units to a station for natural gas, they would
18 burn .4, that is .4 kilograms of carbon dioxide for
19 each kilowatt of net electrical energy?

20 THE CHAIRMAN: I'm sorry, are you looking
21 at 3.18?

22 MR. STARKMAN: I am looking at -- yes.

23 THE CHAIRMAN: Wouldn't it be .5? It is
24 a small matter.

25 MR. MEEHAN: There are a number of

1 natural gas figures if you go down the left-hand
2 column. I think the one that has been picked is the
3 one that is referring to a combined cycle.

4 MR. STARKMAN: Q. Yes.

5 MR. MEEHAN: A. Yes. We don't have any
6 of those stations so we would have to build one.

7 Q. But if you installed that it would be
8 .4; is that right?

9 THE CHAIRMAN: But I thought we were
10 talking about Nanticoke and Lambton, were we not?

11 MR. STARKMAN: We are talking about --

12 THE CHAIRMAN: Converting them?

13 MR. STARKMAN: Yes.

14 MR. MEEHAN: Converting them to a
15 combined cycle--

16 MR. STARKMAN: Q. Yes.

17 MR. MEEHAN: A. --plant? That's in the
18 order of what we would get, yes.

19 Q. And if you just convert to natural
20 gas you would get .5?

21 A. Shown nearer the bottom, is it?

22 Q. No, I am looking on conventional
23 boilers, five from the top?

24 A. Yes, I see it. I would agree with
25 that.

1 Q. Yes. Right now you are burning...

2 A. U.S. bituminous at .9?

3 Q. Yes.

4 A. Yes.

5 Q. So you would do substantially better
6 with this sort of conversion?

7 A. With respect to CO(2) emissions, yes.

8 Q. Now, you say it is not economic to do
9 this; am I correct?

10 A. That's right.

11 Q. When you say these things, it is not
12 economic, what do you mean "it is not economic"?

13 A. They do not include the externalities
14 that you have been referring to earlier. So I am
15 looking at the total cost to Ontario Hydro, total real
16 cost to Ontario Hydro with doing it with natural gas or
17 with coal.

18 Q. So it is just simply saying it is not
19 economic because it will be more expensive in real
20 dollars to change it and burn natural gas than it would
21 be to continue to burn coal?

22 A. Yes.

23 THE CHAIRMAN: Well, I take it that the
24 position is the same as it was when the evidence was
25 given on Panels 2 and 3, would that be right, where

1 this matter was extensively gone into. Is that what
2 you are saying?

3 MR. MEEHAN: Yes.

4 MR. STARKMAN: Well, Mr. Chairman, I'm
5 sorry, but Ontario Hydro can't have it both ways. They
6 can't say we gave our evidence in Panel 2, ignore that
7 evidence on life extension and whatever other matters
8 we don't like because we have further and better
9 evidence today, but then revert back to relying on
10 Panel 2's evidence when it suits them.

11 [12:14 p.m.]

12 THE CHAIRMAN: No, but all they are
13 saying is, as I understand it, is the way you work out
14 economics has not changed; that that has not changed.
15 And that, as you remember, was gone into in great
16 detail.

17 MR. STARKMAN: Yes. All right. Let me
18 rephrase the question a little differently.

19 Q. Mr. Meehan, ignoring costs, all
20 right, let's ignore the costs for a moment and let's
21 look at Nanticoke, what is it that you propose to do to
22 Nanticoke at the present time in respect to emission
23 control or pollution abatement?

24 MR. MEEHAN: A. In the updated plan
25 prior to the year 2014, we planned to install scrubbers

1 on all eight of the units and SCRs, but those two
2 facilities are with respect to air emissions and I
3 think that is what you are wanting to concentrate on.

4 Q. All right. Now, leaving aside the
5 cost, what else could you install on those units to
6 reduce emissions? What else could you do to them that
7 would reduce emissions?

8 We are talking about Nanticoke now; Is
9 that correct?

10 A. Yes. I guess I omitted the enhanced
11 precipitators as something else that are included in
12 the updated plan.

13 Q. All right.

14 A. So, there is the three major capital
15 facilities that we would add there. I don't know what
16 else we might do unless you are wanting me to suggest
17 that we might add natural gas, but if we added natural
18 gas, we wouldn't do two of those three things: We
19 wouldn't add scrubbers and we wouldn't add enhanced
20 precipitators.

21 Q. Mr. Meehan, let me put it more
22 clearly: With respect to Nanticoke, other than what
23 you have mentioned - scrubbers, SCRs and
24 precipitators - and cost is not a criterion being used
25 here, your evidence is there is nothing else that could

1 be done at Nanticoke to lower emissions?

2 MR. SHALABY: A. I think this notion of
3 cost is not a criteria. We are not used to it. We
4 can't think in that dimension. You can shut it down.
5 That is one aspect.

6 MR. MEEHAN: A. That is what I was going
7 to suggest; we could reduce its operation or we could
8 shut it down.

9 THE CHAIRMAN: Just a minute, only one
10 person should speak at a time.

11 MR. SHALABY: Yes. I think we got to
12 that concepts in Panel 3 and Panel 4 at times of
13 ignoring costs, what would happen and it just takes us
14 so far away from the way we plan, the way we operate
15 our business, that we can arrive at trivial and
16 non-helpful solutions.

17 MR. STARKMAN: Q. Well, that may be so,
18 Mr. Shalaby, but I am interested in knowing, if cost
19 was not a consideration, what could be done to reduce
20 emissions from the existing fossil facilities?

21 MR. SHALABY: A. We could shut them
22 down; that can reduce the emissions completely.

23 Q. I understand that, okay. I am not
24 ultimately ignoring costs. I think costs do get
25 factored into it and you have to determine whether they

1 are reasonable and what the trade-offs are, but I am
2 asking whether or not this is a complete list?

3 Mr. Meehan, scrubbers, SCRs,
4 precipitators and perhaps converting to natural gas are
5 the only options and shutting it down?

6 MR. MEEHAN: A. I think the first three
7 of those are the best available technology. Except for
8 the particulate, I suppose we could go a further step
9 and put baghouses rather than enhanced precipitators,
10 but that is all I can think of.

11 Q. All right. What about for Lambton?
12 I mean, the same question, which is costs are not a
13 consideration, what could be done to that facility to
14 reduce emissions?

15 A. The same things.

16 Q. Scrubbers, SCRs, enhanced
17 precipitators?

18 A. Yes.

19 Q. And possibly converting to natural
20 gas?

21 A. Yes.

22 Q. All right.

23 MR. SMITH: A. I think the other thing
24 that you could do is having put scrubbers on, while we
25 plan on using a medium sulphur coal in those units, you

1 could, in fact, go to a very low sulphur coal and scrub
2 it as well and get a marginal improvement in emissions
3 on that basis. I am not advocating it; it is just
4 something we could do. It is not a technical change to
5 the plan.

6 Q. So, as well, Mr. Smith, other than
7 what you have added, you can't think of anything else
8 that could be done to either Lambton or Nanticoke to
9 reduce their emissions, cost not being a factor?

10 MR. MEEHAN: A. I think you have it. I
11 can't think of anything.

12 Q. Now, is your answer the same for the
13 other fossil facilities? Can we just look at them
14 briefly? The same question, cost not a factor, what
15 could be done to these?

16 A. I think that we have given you the
17 technologies that are available that we are aware of
18 unless we are all missing something here. I think you
19 have them. And technically, they could be installed on
20 all of the facilities, I suppose; some with greater
21 difficulty than at other stations.

22 THE CHAIRMAN: Do you have any other
23 technology you want to suggest that they might be
24 looking at?

25 MR. STARKMAN: No, not at this time. I

1 don't have anything specific I want to put to them.

2 THE CHAIRMAN: All right.

3 MR. STARKMAN: They say if cost was not a
4 problem, what would they do compared to what they are
5 doing when they say that they factor in the costing.

6 MR. MEEHAN: I am not sure I answered
7 this is what we would do. This is what we could do.

8 MR. STARKMAN: Q. Well, I thought you
9 told us that at Nanticoke, you were going to put in
10 scrubbers, SCRs and enhanced precipitators.

11 MR. MEEHAN: A. Yes, that part is true,
12 but the other stations, the could would apply rather
13 than the would.

14 Q. Exactly, except for Lambton where you
15 are doing the same?

16 A. That is true.

17 Q. The only additional thing you can
18 think of doing is perhaps using lower sulphur coal and
19 scrubbing it perhaps and there is the question of
20 natural gas?

21 A. Yes.

22 Q. Okay.

23 A. There may be technical limitations
24 with respect to burning the lower sulphur coal.

25 Q. Mr. Meehan, I just wanted to -- maybe

1 I should ask this question of Mr. Dawson.

2 Mr. Dawson, in our exhibit package here
3 at page No. 2, Exhibit 486, I have reproduced again the
4 executive summary of a report entitled, The Carbon
5 Dioxide Issue in Ontario Hydro Perspective. I take it
6 you are familiar with this document?

7 MR. DAWSON: A. It is a long time ago
8 when I signed and approved that report, but it does
9 tend to come back and haunt you, doesn't it?

10 Q. That is your signature on the cover
11 page?

12 A. Yes, it is.

13 Q. The entire report, I didn't reproduce
14 it. It seems to have been part of an answer to
15 Interrogatory 11.7.10 and I have it if --

16 THE CHAIRMAN: I think there is a more
17 recent. I see Exhibit 40 would update this; is that
18 correct?

19 MR. SHALABY: No. 40 again, yes.

20 DR. EFFER: That is a more recent and
21 more comprehensive discussion of the greenhouse
22 phenomenon, yes.

23 THE CHAIRMAN: Of the same subject?

24 DR. EFFER: It overlaps a substantial
25 amount of the material which is contained in this

1 executive summary here, yes.

2 MR. STARKMAN: Q. Mr. Dawson, I wanted
3 to ask you some questions about this and they are in
4 the vein of trying to find out how it is that Ontario
5 Hydro proceeds and responds to pollution problems or
6 environmental-type problems and I am looking at page 4.

7 In the second full paragraph, it starts
8 off:

9 Control of emissions can be
10 accomplished by improved fuel efficiency
11 or conservation, changing fuel type, eg.
12 developing nuclear power and/or a
13 hydrogen-based fuel cycle and improved
14 use of our hydroelectric and other
15 renewable resources. Scrubbing of fossil
16 fuel emissions in Ontario Hydro stations
17 to remove CO(2) is presently economically
18 prohibitive and would pose significant
19 problems regarding disposal of scrubber
20 effluents and so on.

21 I won't read it. I think everyone can
22 read it.

23 THE CHAIRMAN: I am sorry, I did not hear
24 that last --

25 MR. STARKMAN: I said, I won't continue

1 to read. I just leave it for people to read the
2 balance of that paragraph and the next paragraph.

3 Q. Mr. Dawson, I take it from reading
4 this that Hydro was aware of problems with its CO(2)
5 emissions back in the early '80s; would that be fair?

6 MR. DAWSON: A. We were aware that it
7 was an emerging issue, that's right.

8 Q. All right.

9 A. In fact, that report summarized the
10 issue and produced an Ontario Hydro perspective on it
11 at that time.

12 Q. Okay. And the Ontario Hydro
13 perspective at that time, which was in 1984, it looks
14 like there might be a problem here, but we won't do
15 anything because it is too costly; is that the
16 perspective it had?

17 A. Well, I think what we were saying was
18 that it is certainly not something that is well defined
19 at the moment and there don't appear to be certainly
20 any simple solutions to the problem. It is something
21 that I think can only be worked out in the long term.
22 You can't do very much with existing generation
23 technology to improve the situation at anything like an
24 economic cost.

25 Q. Since this report in '84, has Hydro's

1 view changed at all?

2 A. I think we have certainly seen the
3 CO(2) issue develop and it is more to the forefront now
4 than it was back in 1984, but I am not sure we are a
5 lot closer to seeing -- I guess we are somewhat closer,
6 but I am not sure if we are a lot closer to seeing a
7 CO(2) regulation that specifies exactly what emissions
8 Ontario Hydro should meet.

9 Q. Okay. I take it from many of the
10 answers given, that absent a regulation, Ontario Hydro
11 feels no particular need to limit its CO(2) emissions?

12 A. I think we tend to see regulations as
13 providing guidance on whether this is a serious problem
14 or not a serious problem, yes. It doesn't mean we are
15 not prepared to go beyond the regulation, but I think
16 in my book, the Ministry of the Environment is
17 responsible for dealing with environmental issues and
18 should be providing guidance on these things.

19 Q. Right. That has been basically your
20 submission or evidence with respect to acid gases,
21 right?

22 A. I am sorry?

23 Q. That has been basically your
24 submission with respect to SOx and NOx; that the
25 Ministry provided you with the levels and that you meet

1 them?

2 A. That's right, generally, and now we
3 are saying we are going to step beyond there in the new
4 plan in that we are prepared to anticipate regulations
5 and attempt to build to those anticipated regulations,
6 and that is what we are saying we are doing in terms of
7 SO(2) scrubbers and NOx emissions.

8 Q. What is the anticipated regulation
9 you are building to with respect to SOx and NOx?

10 A. Other than that it is going to be
11 more restrictive, I don't think it has been specified
12 explicitly and I don't know what it is precisely.

13 Q. And sticking with CO(2), which is
14 where we started, what steps has Ontario Hydro taken,
15 if any, to reduce its CO(2) emissions?

16 A. What steps have we taken to reduce
17 CO(2) emissions?

18 Q. Yes.

19 A. Well, I think we are trying to
20 achieve it through demand management and NUGs and
21 reduced generation from our existing plant.

22 Q. All right. But in the new plan,
23 isn't it fair to say that with the refurbishment or
24 life extension of Nanticoke and Lambton, you are going
25 to run the fossil units perhaps longer and harder than

1 you have in the last ten years?

2 A. That is true.

3 Q. Particularly if nuclear performance
4 continues to deteriorate?

5 A. If the performance deteriorated, is
6 that what you have said?

7 Q. Yes.

8 A. That is true if efficiency
9 deteriorates, yes.

10 Q. Yes.

11 A. Conversion efficiency.

12 Q. Yes.

13 A. Yes.

14 Q. But even without that such
15 deterioration, the new plan calls for the burning of
16 more coal than you have burned in the past?

17 A. I don't know that that is true, no.

18 MR. MEEHAN: A. I don't believe that
19 that is true. I think that the burning of coal is
20 reduced from what it was in the 1989 plan. And with
21 respect to Mr. Dawson's answer, we intend because of
22 life extension to work them longer, but I don't think
23 we are going to be working them any harder.

24 Q. Mr. Meehan, can you just amplify on
25 what you mean when you say you are going to work them

1 longer but not harder; can you just help me out with
2 that?

3 A. The life extension is extending the
4 time period that they are going to be operating on the
5 system, but with all of the other things that have
6 happened, all of the changes, more significant changes,
7 I think, than the life extension assumption, the
8 reduced load, the demand management, the additional
9 demand management, the additional NUGs, et cetera, the
10 load that we are having to meet with our fossil system
11 is, in fact, lower over that period. I am estimating
12 that it would be lower over that period than it was in
13 the original plan.

14 Q. With Nanticoke and Lambton after the
15 life extension and refurbishment, what will the
16 capacity factors be? Will they be changed from what
17 they are at present?

18 A. At present, they will probably be in
19 the same order I think. It is shown here on Exhibit
20 452. The total fossil increases - it is on page 24 -
21 depending on the option selected, the basic supply
22 option, the figure at the bottom.

23 Q. I am sorry, Mr. Meehan. You say the
24 figure at the bottom which is figure 9.2 on page 24?

25 A. That's correct.

1 Q. And you say this shows --

2 A. Subject to checking, I don't think
3 that the coal energy production which is depicted there
4 is any higher than it was in the original plan.

5 Of course, you can see at the end of the
6 figure there that it depends on whether the new base
7 load facility that is selected for about the year 2010,
8 whether that is nuclear or fossil.

9 Q. Exactly. So, would I be correct in
10 assuming that based on this, the fossil plants are sort
11 of the swing fuel? If nuclear doesn't perform as well
12 or if some of the other things in the plan do not come
13 to be - I am talking here about NUGs or DSM or others -
14 then the effect of that will be that the fossil plants
15 will be used more?

16 A. That's correct.

17 Q. All right. So it is, if you like,
18 one aspect of the insurance policy against the failure
19 of the other parts of the system?

20 A. Yes. This is the median forecast
21 here. It could be higher or it could be lower than
22 what is shown.

23 Q. All right. Mr. Dawson, I am still
24 talking about CO(2). And since we are on this exhibit,
25 can we turn to page 27 which is the figure 9.6 of

1 Exhibit 452?

2 MR. DAWSON: A. All right.

3 Q. Now, this in this one, here you have
4 an illustrative target identified with the dashed line.

5 A. Yes.

6 Q. I take it that is the line that is in
7 around -- is that the 25 teragram line that you have
8 been talking about?

9 A. That's correct.

10 Q. Now, what does it mean when it is
11 marked as an illustrative target?

12 A. I think that is a value that has been
13 selected by the corporation as being purely
14 illustrative of something that we think we could meet.
15 It is something that is possible as a future limit on
16 CO(2) emissions.

17 Q. So you say you could meet that?

18 A. Yes.

19 Q. All right. Now, what if the target
20 was at a lower number, say 20; what would Hydro do if
21 the illustrative target was 20?

22 A. I am not sure what we would do if the
23 target was at a point where we couldn't meet it. We
24 may have to rethink the plans and, in fact, install a
25 combined-cycle plant earlier than our current plans

1 would show.

2 [12:35 p.m.]

3 Q. Can you help me out with any more
4 detail on that?

5 I mean, I am trying to figure out what
6 the sensitivity of this illustrative target was. You
7 put it in there at 25, I believe, and there was some
8 previous discussion about how it goes a little above
9 that post 2010.

10 But have you done any analysis or can you
11 help me out with more detail on what it would be to
12 lower that line by whatever increments you would like.
13 I mean, if you lowered it by --

14 A. I certainly haven't done any
15 analysis, no, and I am not aware of any. It certainly
16 wouldn't be my job to do that sort of analysis.

17 But, I mean, certainly there are
18 technologies that would produce lower CO(2) emissions
19 than conventional steam cycle, and in terms of fossil
20 technologies those would be things like higher
21 efficiency and things that could burn gas, and those
22 would be combined cycle.

23 MR. MEEHAN: A. I think in the
24 appendix - is it Appendix C of Exhibit 452 - the second
25 page which is not numbered, the bottom two paragraphs

1 talk about what we might do in the event that we had to
2 meet a lower target, or at least you could use that
3 information. In the bottom paragraph here.

4 It refers to increased reliance on demand
5 management and higher efficiency non-utility generation
6 and the use of more efficient alternative energy
7 technologies and the development of hydraulic and
8 nuclear options.

9 It talks about technology transfers and
10 provision of more efficient energy supply and
11 utilization systems to other countries. And emission
12 trading is mentioned there. Also mitigation through
13 tree planting could be used.

14 Q. It doesn't mention the answer Mr.
15 Dawson gave, which is the combined-cycle option?

16 A. I beg your pardon?

17 Q. It does not mention --

18 A. I think what it is referring to there
19 is the more efficient alternative generation
20 technologies and the higher efficiency non-utility
21 generation. That is generally combined cycle or
22 cogeneration.

23 Q. Can I ask you a similar question with
24 respect to the NOx and SOx guidelines? I don't know if
25 this is for Mr. Smith or for Mr. Meehan, but it started

1 off at 430 and it steps down to 215 in 1994.

2 A. Yes.

3 Q. Now, I would just like to discuss
4 with you what would be involved in lowering that
5 number? I mean, not what would be involved from the
6 government's point of view, but if the number was lower
7 what would Hydro have to do to respond to it?

8 A. Well, for SOx or SO(2) we would
9 install scrubbers, as we are planning to do in the
10 updated plan. And the effect of that is shown on page
11 26 of Exhibit 452.

12 In figure 9-4 from 1995 onward the
13 regulated limit for SO(2) alone is 175 gigagrams per
14 year, and the effect of the addition of the scrubbers
15 at Nanticoke and Lambton that I am talking about - that
16 I have been talking about - is shown in that figure.

17 Q. Bringing it down to a number that's
18 like, say, in the 70 range starting in around the year
19 2000?

20 A. 60 or 70, yes.

21 Q. All right. What about NOx?

22 A. NOx would be shown on the next page.
23 And again a target is used there because there is no
24 regulation at this time, and the decrease in NOx
25 emissions shown are as a result of adding the

1 combustion process modifications and the SCRs.

2 Q. All right. Now, to bring it down
3 even lower than that I take it it would involve putting
4 those types of technologies onto other plants, other
5 fossil plants?

6 A. We have got them pretty well on every
7 plant, if you are referring to NOx now, are you?

8 Q. No, well, all right, with NOx.

9 A. If we wanted to further reduce the
10 NOx emissions we could install SCRs on a number of
11 other units, yes. There are a number of units that
12 don't have that technology installed on them.

13 Whether it would be cost-effective or not
14 I guess is the question.

15 Q. I understand. I am coming to that.
16 I haven't forgotten about it. You could install them
17 on other units. What about with respect to the SOx?
18 What could you do to further reduce that?

19 A. There are other units that don't have
20 scrubbers installed on them in this plant.

21 Q. So let's come to the cost, then. If
22 you wanted to put on these scrubbers what is the cost
23 of that in your view, a ballpark costing?

24 A. Two 500 megawatt units, if I can talk
25 about the pair that we are installing at Lambton for

1 service in 1994, they are \$537 million for two units.

2 Q. I'm sorry?

3 A. \$537 million for the first two units
4 at Lambton for service in 1994, so in future dollars
5 they are \$537 million.

6 Q. All right.

7 A. Those costs, if you like, in 1991
8 dollars are shown in figure C-1 in Exhibit 452, and it
9 is on the third page of Appendix C, which again is not
10 numbered.

11 It shows four units, four FGD units at
12 Lambton, for a capital cost of about \$700 million in
13 1991 dollars. So that figure shows the capital cost of
14 facilities. It also shows the OM&A cost as well.

15 Q. Can you look for me at page 28 of
16 Exhibit 468, which is the environmental and health
17 effects document?

18 A. I have it.

19 Q. Okay. The first paragraph on the
20 page sets out Hydro's fossil generating stations'
21 contribution to air emissions in the province, and it
22 says that the figure lists the '88 provincial air
23 emissions for conventional pollutants and volatile
24 organic compounds. It can be seen that in '88 Ontario
25 Hydro's fossil stations accounted for 23 per cent of

1 the SO(2), 15 per cent of the NOx, 1 per cent of the
2 particulates and for about .1 per cent each of VOCs and
3 CO.

4 Then, in the paragraph following the
5 figure, the last paragraph says: After 1995 Ontario
6 Hydro will contribute about 20 per cent of the
7 provincial SO(2).

8 A. I'm sorry, where am I looking for
9 that?

10 Q. In the last sentence of the paragraph
11 following figure 3.14?

12 A. Yes, I see it now.

13 Q. Now, what I wanted to ask about was
14 that you recall it says in '88 the generating stations
15 accounted for 23 per cent of the SO(2) and then after
16 '95 it will account for 20 per cent.

17 A. Yes.

18 Q. Have I got that right?

19 A. Yes.

20 Q. Now, '95, isn't that the first year
21 that the final stepdown in the regulation kicks in?

22 A. '94 is the first year.

23 Q. And it steps down to 215?

24 A. 215 of SOx and NOx, 175 of SO(2).

25 Again, that's shown on page 26 of Exhibit 452.

1 Q. Right. And that's half of what it
2 was in '88, which is 430?

3 A. I'm sorry, where should I be looking?

4 Q. I am just saying that the 215 is half
5 of the 430 which was the regulation in effect in '88.

6 A. Oh. Yes.

7 Q. What I don't understand is if you are
8 stepping down, if the regulation is stepping down by
9 half and your figures as you pointed out in 452
10 indicate it is going to fall off considerably, why does
11 Hydro continue to contribute 20 per cent of the
12 provincial SO(2)?

13 A. It could be something as simple as
14 the SO(2) in the rest of the environment is increasing
15 so much.

16 Q. Or decreasing?

17 MR. BURPEE: A. Decreasing.

18 MR. DAWSON: A. I think you have got to
19 remember that the Ministry is also regulating the
20 smelters, for instance, and the steel companies in
21 terms of SO(2) emissions as well. They are coming
22 down, so...

23 Q. Exactly, Mr. Dawson. So the
24 conclusion you might draw is that everyone else is
25 doing a lot better than Hydro.

1 MR. MEEHAN: A. No, I think roughly the
2 same.

3 MR. DAWSON: A. No, the conclusion you
4 draw is that Hydro is doing better than everybody else
5 because our percentage is now lower as a total. It is
6 now 20 per cent rather than 23 per cent.

7 MR. MEEHAN: A. If it had stayed at 23,
8 I think what Mr. Dawson is saying, then we would be
9 doing the same as everyone else.

10 Q. But with what you are doing it has
11 come down 3 per cent? That's your estimate?

12 A. Three per cent on 23 per cent, yes.

13 MR. SHALABY: A. We would be doing that
14 while producing maybe 50 per cent more electricity as
15 well. Other companies will be meeting their emission
16 limits by shutting down.

17 Q. Mr. Shalaby, I wanted to ask you
18 about alternate energy, and there is a section in
19 Exhibit 486 at the back, beginning on page 13.

20 THE CHAIRMAN: Sorry, what was the
21 exhibit again, Mr. Starkman?

22 MR. STARKMAN: Page 14, Exhibit 486.

23 MR. SHALABY: I have it.

24 MR. STARKMAN: Q. Mr. Shalaby, you have
25 had a chance to look at this material?

1 MR. SHALABY: A. I have had a look at
2 it, yes.

3 Q. I think what it suggests is that when
4 Ontario Hydro made a presentation to the Select
5 Committee on Energy in August of '88 they estimated
6 that the cost of wind power would be \$7,500 per
7 kilowatt?

8 A. Yes.

9 Q. That is set out, I guess, on page 15,
10 page 13 at the top, 15 at the bottom?

11 A. Yes.

12 Q. Now, if you turn to the last page in
13 the exhibit, which is marked 19 at the bottom, I am
14 reading here from the response, the second paragraph:

15 The capital cost of 7,500 per
16 kilowatt was a ballpark estimate based on
17 inclusion of the following cost
18 components...

19 And then it lists the components.

20 Now, in your filings for this hearing you
21 have estimated a much different number--

22 A. Yes.

23 Q. --for wind?

24 A. Yes.

25 Q. Can you recall what that is?

1 A. Lower than \$2,000 a kilowatt in the
2 long term, somewhere between 1,000 and 2,000. I can
3 get the exact number.

4 Q. My question is, what has changed
5 between 1988 and 1992 which would cause this number to
6 decrease dramatically, if you like, from 7,500 to 1,000
7 to 2,000?

8 A. Well, I think the response that you
9 are showing on page 19, it appears to me to be looking
10 at perhaps a remote community or some difficult
11 installation or remote installation.

12 When there is data like access roads and
13 cement foundations, wind turbine unit transportation
14 and installation, typically installations in remote
15 communities are quite expensive. You have to fly in a
16 lot of the parts, labour is expensive, accommodation is
17 expensive.

18 So while I am not familiar in detail with
19 what the 7,500 estimate was based on, it appears to me
20 that it perhaps had a component of a remote
21 installation to it.

22 But, at any rate, the experience in the
23 States and in Canada has been that unit prices have
24 been coming down. They have come down both in the
25 States and here, and our current estimate is that you

1 can get wind turbines somewhere between \$1,000 and
2 \$2,000 per kilowatt.

3 Q. So the major reason why the number is
4 coming down is the cost of acquiring the equipment?

5 A. Mostly that. Especially if you are
6 going to do it in a wind farm situation. Then the
7 costs of roads would be divided over larger kilowatts,
8 not a single turbine, for example. Maintenance crews
9 and so on, all of that will be divided over a larger --
10 it would be economies of scale when you go to a wind
11 farm situation as well.

12 Q. Do you think the costs are continuing
13 to fall? I mean, this is a steep fall in a short
14 period of time, right - 7,500 to 2,000 in three years?

15 A. I don't think the assumptions are
16 exactly the same, but yes, in answer to your question,
17 yes, prices are continuing to fall.

18 Q. Do you still say that the cost of
19 putting it into a remote community today is 7,500?

20 A. I don't have a detailed estimate of
21 installation in remote communities. Those would be
22 very specific to how remote the community is and how
23 difficult the installation is.

24 But typically remote communities are
25 quite a different ballpark than closer to the grid.

1 Q. Now, yesterday I think you were asked
2 what the research and development budget was for
3 alternate technologies and you gave an answer.

4 A. Yes.

5 Q. I just don't recall what it is or
6 what the answer was.

7 A. We provided that in interrogatory
8 responses. One of them is Interrogatory No. 7.14.22.

9 Q. And do you recall --

10 THE CHAIRMAN: Hold it. Better give that
11 one a number. Has it already been given one?

12 THE REGISTRAR: Just a moment.

13 THE CHAIRMAN: 7.14.22.

14 THE REGISTRAR: I have a lot of numbers
15 to check here.

16 MR. SHALABY: It says that the budget for
17 1991 is approximately \$450,000. This is the Research
18 Division budget towards renewable energy or alternate
19 energy technology.

20 MR. STARKMAN: Q. Do you know what it
21 was over the five-year period before that?

22 MR. SHALABY: A. Interrogatory 8.38.1
23 has research and development expenditures back to 1985,
24 but it is categorized under Utilization and
25 Alternatives. It is it is a broader category than just

1 alternative energies.

2 [12:53 p.m.]

3 Q. All right.

4 THE REGISTRAR: That number, 8.38.1?

5 THE CHAIRMAN: Yes.

6 MR. SHALABY: And that is about \$3
7 million to \$4 million per year over that period,
8 utilization and alternatives.

9 THE CHAIRMAN: Just a moment. Let's get
10 the interrogatory straightened away. There are two of
11 them now that we have got -- 7.14.22.

12 THE REGISTRAR: I can't find that in the
13 previous number.

14 THE CHAIRMAN: So give it the next
15 number.

16 THE REGISTRAR: That will be 475.19.
17 ---EXHIBIT NO. 475.19: Interrogatory No. 7.14.22.

18 THE CHAIRMAN: And 8.38.1?

19 THE REGISTRAR: Will be .20.
20 ---EXHIBIT NO. 475.20: Interrogatory No. 8.38.1.

21 MR. STARKMAN: Q. Mr. Shalaby, would it
22 be possible to extract the renewables from those
23 numbers?

24 MR. SHALABY: A. It wasn't easy to do at
25 the time of the interrogatory response; I don't expect

1 it to be easy now either, but the majority would be in
2 the utilization in my judgment.

3 Q. Just for my information, when you say
4 with the utilization, what is utilization referring to?

5 A. Heat pumps, things of that nature.

6 Q. Okay. Would you think it would be a
7 smaller number than the 450 that is in for '91?

8 A. The same order. I can't say whether
9 it is slightly larger or slightly smaller, something in
10 that order. That is the research division budget.

11 Q. Yes.

12 A. There is added expenditures on
13 alternatives in the design and development division.

14 Q. I understand that.

15 A. That is also in the interrogatory
16 response.

17 Q. All right. That is in 8.38.1?

18 A. Yes.

19 Q. Now, with respect to fossil
20 generation, what is the research budget for fossil
21 generation?

22 A. Fossil and hydraulic is slightly
23 smaller than utilization alternatives over that time
24 period.

25 Q. Okay. And what is it?

1 A. Ranging from 4 per cent to 7 per cent
2 of the budget. I am reading from 8.38.1 right now.
3 Four to 7 per cent of the research budget, which is \$50
4 million to \$80 million, so somewhere between \$2 million
5 and \$5 million over the years in fossil and hydraulic.

6 Q. Okay. Do you know what the nuclear
7 R&D budget is or should I ask that in Panel 9?

8 A. Yes. I am reading again from 8.38.1
9 and it is between a third to 40 per cent of the
10 research budget, so that would be somewhere between \$20
11 million and \$25 million.

12 THE CHAIRMAN: Okay, just repeat that
13 interrogatory number again.

14 MR. SHALABY: 8.38.1.

15 THE CHAIRMAN: Thank you.

16 THE REGISTRAR: 8.38.1?

17 THE CHAIRMAN: We have already got it in.
18 I thought he said another number.

19 MR. SHALABY: No, it is the same number.

20 Again, that is the research division
21 budget. There are other expenditures throughout the
22 company and elsewhere on research in these matters, all
23 of them - fossil, hydraulic, nuclear, et cetera.

24 MR. STARKMAN: Those are my questions,
25 Mr. Chairman. Thank you very much.

1 THE CHAIRMAN: We will now adjourn for
2 lunch.

3 Mr. Klippenstein, you will be on this
4 afternoon; is that right?

5 MR. KLIPPENSTEIN: Yes, Mr. Chairman.

6 THE CHAIRMAN: 2:30?

7 MR. KLIPPENSTEIN: Yes.

8 THE CHAIRMAN: We will adjourn now until
9 2:30.

10 THE REGISTRAR: Please come to order.
11 This hearing will adjourn until 2:30.

12 ---Luncheon recess at 12:57 p.m.

13 ---On resuming at 2:32 p.m.

14 THE REGISTRAR: This hearing is now in
15 session. Please be seated.

16 MR. HOWARD: Mr. Chairman, before my
17 friend begins, I can add to the record the fact that
18 the whole of the National Energy Board application was
19 delivered with Interrogatory 3.19.3 and it is about two
20 feet of paper, but the whole of it has been delivered
21 in response to an interrogatory from my friends,
22 Pollution Probe.

23 THE CHAIRMAN: Your present friends or
24 your friends of this morning?

25 MR. HOWARD: No, my present friends.

1 [Laughter] I take them where I can get them. I see Mr.
2 Starkman isn't here, but presumably he will read that
3 startling news.

4 THE CHAIRMAN: Mr. Klippenstein?

5 MR. KLIPPENSTEIN: Thank you, Mr.
6 Chairman.

7 CROSS-EXAMINATION BY MR. KLIPPENSTEIN:

8 Q. Members of the Panel, as you may
9 know, I represent Pollution Probe and I will be asking
10 you a series of questions about energy from waste and I
11 will be limiting my questions to that topic basically.
12 And by that, I mean specifically incineration of
13 municipal solid waste. So that is what I will be
14 asking about.

15 THE CHAIRMAN: Just before you start, we
16 could perhaps just in housekeeping put the
17 interrogatory that Mr. Howard mentioned on the record.

18 Is that for this hearing?

19 MR. HOWARD: It has been delivered. It
20 is not on the record, but there are, as I say, two feet
21 of paper and I am sure you don't want the whole thing.

22 THE CHAIRMAN: No, no. I wonder if we
23 should give it a number for this panel as a reference
24 number.

25 MR. HOWARD: Oh, as a reference number.

1 THE CHAIRMAN: Yes.

2 THE REGISTRAR: That was 3.19.3?

3 THE CHAIRMAN: Yes.

4 MR. HOWARD: Yes.

5 THE REGISTRAR: That is .21, 475.21.

6 ---EXHIBIT NO. 475.21: Interrogatory No. 3.19.3.

7 THE CHAIRMAN: Okay. Sorry to interrupt.

8 MR. KLIPPENSTEIN: Thank you.

9 Q. My first point is to clear up what
10 might seem to be an issue, and that is why we are
11 asking questions at all.

12 I take it that despite the government ban
13 on municipal solid wastes, which I will call MSW
14 incineration, Hydro still considers it an option for
15 the future; is that right? And I don't know to whom I
16 should be addressing my questions. I will just have to
17 let you sort that out.

18 MR. DAWSON: A. As I was saying, it is
19 an option for the future to the extent that that ban
20 may be lifted at some point, but obviously with a ban
21 on, then it isn't an option.

22 Q. Right. I take it from Exhibit 344,
23 that it is still Hydro's position that the incineration
24 of MSW could be an economical method of generating
25 electricity?

1 A. Yes, I think that is correct.

2 Q. I would like to spend some time
3 asking questions about the effect of a decision by
4 Hydro to purchase electricity from MSW incinerators.

5 I am asking some of these questions
6 because I get the feeling when I review some of this
7 material that MSW incineration is viewed as essentially
8 a waste management problem and that all Hydro is doing
9 when it buys some of this power is taking advantage of
10 something that would happen anyway. And so that is
11 what I want to address.

12 Would you agree with me that a commitment
13 from Hydro to purchase electrical power from an
14 incinerator would improve the economic prospects of
15 that incinerator?

16 A. Yes, it would.

17 Q. And would you agree with me that a
18 facility, an incinerator facility which would not be
19 economic without an electricity sale might become
20 uneconomic should Hydro decide to purchase electricity?

21 A. Yes. Hypothetically, I think that is
22 probably true, though I would say that I think the
23 revenue that you would get from the generation of
24 electricity would be small relative to the revenue
25 stream that is generated as tipping fees, but that

1 again is hypothetical because you don't know what the
2 tipping fee would be.

3 Q. Right. So there would be some
4 incinerators who would become economic with a decision
5 to purchase electricity from them when they otherwise
6 wouldn't be?

7 A. That could be the case, yes.

8 Q. Would you agree that the result of
9 that is that it is likely that if Hydro decides to
10 purchase electricity from MSW incinerators, that more
11 incinerators will be built than would be built if Hydro
12 decided not to purchase such electricity?

13 A. I would say that is possible. I
14 don't know how likely it is, but it is possible, yes.

15 Q. Has Hydro given any consideration to
16 that category of incinerators which you agree may
17 possibly exist which would be built as a result of
18 Hydro's decision to buy electricity?

19 A. I think in Exhibit 344 we did refer
20 to what we thought was the future potential of MSW and
21 I think we estimated that if the ban was lifted, it
22 could amount to perhaps, I think 200 megawatts was the
23 figure.

24 Q. Have you analyzed how many
25 incinerators would be built as a result of Hydro's

1 decision to purchase electricity; in other words, how
2 many incinerators which wouldn't be economical without
3 electricity sales would become economical taking into
4 account electricity sales?

5 A. We haven't done that analysis, no.

6 Q. All right. If I could refer you to
7 Exhibit 344, and we will look at that, to page 172 and
8 if you look at figure 6-10-5.

9 Now, am I correct in understanding this
10 is an analysis of the economic feasibility of a
11 potential 50 megawatt incinerator plant.

12 A. That is correct, yes.

13 Q. On one side of the scale, you have
14 put in the capital and OM&A costs; and on the other
15 side of the scale, you have put the present value of
16 benefits not including tipping fees and the present
17 value of tipping fees; is that right?

18 A. That is correct, yes.

19 Q. The net result of this chart is that
20 you have concluded that if tipping fees are \$17
21 approximately, the plant will be economical?

22 A. That is the breakeven point, yes.

23 Q. I am sorry, the breakeven point,
24 that's right.

25 And that includes \$135 million worth of

1 electricity benefits; is that right?

2 A. Yes, that is correct.

3 Q. Now let's move up to the next column,
4 which is headed "tipping fees at \$30", right?

5 A. Right.

6 Q. The incinerator indicated by that
7 column is shown to be economical in this scenario; is
8 that right?

9 A. That's right, yes.

10 Q. Now, if I knock out that \$135 million
11 of electricity sales, then we are weighing \$195 million
12 against \$127 million; is that right?

13 A. That is correct, yes.

14 Q. And so that plant would no longer be
15 economical; is that right?

16 A. That's right, yes.

17 Q. And so in that situation, the
18 decision by Hydro to buy electricity makes a difference
19 as to whether or not that plant is built?

20 A. That's right, though without the
21 electricity sales, all you would have is an incinerator
22 and all you wanted to build was an incinerator, you
23 -- would build something at a lower capital cost. It
24 wouldn't have the heat exchange surface that you would
25 build into the boiler, so it is not exactly a fair

1 comparison.

2 Q. Okay. So you are saying if I knocked
3 out the 135 million, the 195 would be somewhat lower?

4 A. Yes, and I don't know how much lower.
5 It would be somewhat lower.

6 Q. Okay. But it is possible, even
7 accounting for what you have just mentioned, that
8 electricity makes the difference for this \$30 scenario?

9 A. Yes, under those circumstances,
10 that's right.

11 Q. Yes. Now let's move up to the next
12 column, the \$60 tipping fee scenario.

13 A. Right.

14 Q. If I knock out the \$135 million in
15 electricity sales and then comparing \$195 million to
16 \$259 million; is that right?

17 A. Correct.

18 Q. And that plant is profitable even if
19 there is no electricity sales; is that right?

20 A. Yes.

21 Q. So is it logical or reasonable to say
22 that somewhere in between those tipping fees of \$60 and
23 \$30, there is the line where an incinerator becomes
24 economic or non-economic without electricity in the
25 picture?

1 A. Yes, that's correct.

2 Q. All right. Now, I take it it might
3 be said that the scenario I have just discussed is
4 somewhat irrelevant considering the level of tipping
5 fees in the Metro area these days.

6 Would you agree that might be said?

7 A. Yes. They would tend to be higher
8 than \$60 rather than lower than \$60, that is for sure.

9 Q. That's right. But that may not be
10 true outside of Metro Toronto; is that right? The
11 tipping fees are substantially lower?

12 A. I would imagine they are somewhat
13 lower, but it depends on the circumstances.

14 Q. So in other words, the decision of
15 this Panel as to whether or not it agrees with the
16 evidence Hydro is presenting about the advisability of
17 purchasing electricity from incinerators may well make
18 a difference as to whether or not incinerators are
19 built?

20 A. It would if the ban was lifted, then
21 it may have an influence on how many incinerators are
22 built, yes.

23 Q. Yes. Thank you for that proviso.

24 I would like to then ask you some
25 questions about the relationship between MSW

1 incineration and the three Rs.

2 Would you agree with me that MSW
3 incineration is in economic competition with the three
4 Rs; and by that I mean, progress in the three Rs can
5 inhibit or block progress of MSW incinerators and vice
6 versa; is that a fair statement?

7 A. I would agree it can reduce the
8 number of incinerators that you may need because the
9 volume of refuse that is available for combustion is
10 reduced, yes.

11 Q. And would you agree that vice versa
12 applies as well; in other words, that the competition
13 from incinerators can reduce the practice of the three
14 Rs?

15 A. It could. I wouldn't want to say it
16 would. I think it depends on regulations. It would
17 depend on a lot of things as to whether that, in fact,
18 is the case or not.

19 Q. But it might well?

20 A. It could, yes.

21 Q. Just as an example, maybe I could ask
22 you to turn again to Exhibit 344 to page 178.

23 A. 170 --?

24 Q. 178.

25 A. 8.

1 Q. Which is figure 1-1. And if I look
2 at the bottom of the chart in the category of municipal
3 solid waste and run across to the far right for the
4 column headed Predicted by year 2014, I see that the
5 chart indicates that the predicted development in use
6 of MSW depends on the success of waste reduction, reuse
7 and recycling initiatives; is that right? That is what
8 it says?

9 A. That is correct, that is what it
10 says, yes.

11 Q. And you would agree with that?

12 A. Generally, yes. I don't think the
13 two things are mutually exclusive, but I think they
14 certainly influence each other; that is for sure, yes.

15 Q. They are not mutually exclusive, but
16 would you agree that they are in economic competition
17 as we discussed before?

18 A. Certainly the municipal solid waste
19 will have an impact on the economics of recycling, yes,
20 because you have an alternative with another potential
21 revenue.

22 [2:46 p.m.]

23 Q. To put it another way, a producer of
24 garbage will look to see which option most
25 inexpensively takes care of his or her waste problem.

1 That's another way of putting it; right?

2 A. Yes.

3 Q. And if that waste producer sees that
4 it is cheaper to bring the waste to an incinerator he
5 or she is not likely to engage in the three Rs to the
6 same degree. Do you agree with that?

7 A. Given it's a free choice, yes, that's
8 right.

9 Q. Could I then ask you to turn to one
10 of the documents I have placed in front of you, which I
11 would propose to enter as an exhibit, and it is the
12 document entitled The Road to the Future May Be Paved
13 With Fiction. It's a Globe and Mail article.

14 THE REGISTRAR: That will be Exhibit No.
15 487.

16 ---EXHIBIT NO. 487: Globe and Mail article entitled
17 The Road to the Future May Be Paved
18 With Fiction.

19 MR. KLIPPENSTEIN: Q. Have you located
20 that?

21 MR. DAWSON: A. Yes.

22 Q. I apologize for not providing this to
23 you earlier, but I would direct your attention just to
24 save time to the middle column of that news article
25 from the Globe and Mail to the paragraph headed "But
there are options..."

1 A. Right.

2 Q. And if you could read that and then
3 skip down a paragraph.

4 A. Right.

5 Q. Now, this article describes a book
6 publisher who wants to get rid of large quantities of
7 paper waste and decides that rather than paying \$150 a
8 tonne to dump it into a landfill site it will pay \$50 a
9 tonne to deliver it to a recycler.

10 Now, you can never trust what you read in
11 the newspapers, but assuming that this is true for the
12 moment would you agree that that is an example of
13 economic competition between the three Rs and a
14 landfill site which might as well be an incinerator?

15 A. Yes.

16 Q. Thank you. Let me then focus for a
17 moment along the same lines on the analysis regarding
18 incinerators in your materials.

19 I believe - and I will go into it in more
20 detail if it is required - that one assumption in
21 projecting the amount of power available from
22 incineration is that communities of 50,000 people
23 produce enough waste to support an incinerator and that
24 that is a bit of a threshold; is that right?

25 A. Yes, it is a number like that. I -

1 wouldn't argue with that number.

2 Q. Right. Now, let's look at that
3 example, and an aggressive recycling or an aggressive
4 program of the three Rs might well bring the waste in
5 such a community below the threshold so that an
6 incinerator which previously or maybe now is
7 economically viable would no longer be economically
8 viable; is that right?

9 A. That would tend to be the case, yes,
10 although the increase in tipping fees is tending to
11 work in opposite directions.

12 Q. But a community of 50,000 which may
13 be some distance from Metro Toronto is probably
14 experiencing much lower tipping fees than we are used
15 to in this locale. I think that is correct, isn't it?

16 A. Well, except that I think that Metro
17 Toronto is having a big influence on tipping fees in a
18 large area around there. I mean, for instance, Orillia
19 is being looked at as a potential waste disposal site,
20 and so on. So I think tipping fees everywhere are
21 escalating.

22 But you are right. I would agree that
23 they will tend to be lower the further away from Metro
24 Toronto you go, yes.

25 Q. Thank you. Let me use another

1 example, and I don't mean to flog a horse dead or alive
2 so I will make this my last example, but suppose a
3 municipality builds an incinerator and then gives
4 consideration to programs of the three Rs, and spending
5 money to support programs of the three Rs. Would you
6 agree that an onlooker could correctly say to the
7 municipality, you are spending money to hurt your own
8 investment?

9 A. That depends on whether the
10 incinerator is capable of burning the entire garbage
11 production for that municipality or not. Providing
12 there is adequate garbage to supply the incinerator,
13 then I don't think you have hurt your investment.

14 In fact, that has tended to happen in
15 Europe. There have been instances where what has
16 tended to happen is the heating value of the refuse
17 goes up as a result of recycling programs because
18 material is removed which in fact has a low heating
19 value and the net effect has been an increase in
20 heating value, and that limits the amount of garbage
21 that you can actually burn. So the actual tonnage
22 reduces; the amount of energy production remains much
23 the same.

24 Q. We will get to the effect of the
25 - three Rs on the quality of garbage.

1 A. So if the incinerator is sized just
2 to match the municipal garbage supply and then you go
3 into a recycling program and thereby reduce the amount
4 of garbage available, to that degree, yes, you have
5 reduced the economics of the incinerator.

6 Q. Okay. Thank you.

7 Now, I would like to address what I might
8 suggest is an overall approach of Hydro in dealing with
9 the incineration question, and that is that there is an
10 absence of a follow-through on some of the policies
11 expressed in Exhibit 344.

12 For example, has Hydro done an analysis
13 of the best case scenario from the three Rs and then
14 tested whether an incinerator would be economical?

15 A. I'm not sure I follow what you mean
16 there.

17 Q. Okay. Well, let me back up, then.

18 I believe that Exhibit 344 assumes a
19 recycling or diversion percentage of 50 per cent for
20 the garbage; is that correct? I believe that is
21 correct. I can perhaps help us out by referring to the
22 exhibit itself. If you turn to page (ix) of the
23 Executive Summary in the first column--

24 A. Right.

25 Q. --it is paragraph that begins:

1 Assuming that 50 per cent of garbage
2 is recycled, currently it would be
3 possible to generate up to 145 megawatts.

4 There are other mentions in the --

5 A. That is correct, but I don't know
6 that -- I mean, it doesn't affect the economic
7 evaluation that we did in that we assumed a refuse
8 incinerator, we assumed there was sufficient garbage to
9 fuel it, and we looked at a range of tipping fees, and
10 we looked at the electrical generation that came out of
11 it.

12 Q. So, in your view, the existence of
13 the recycling program had no effect on the economic
14 viability.

15 A. Yes, you have got to recognize
16 Ontario Hydro is not in the municipal solid waste
17 business. We are looking at it as a non-utility
18 generator, and we are saying, if it is there then we
19 will use it, if it isn't there we won't.

20 Q. But you have just agreed with me that
21 Hydro's decision on this issue might well affect the
22 number of incinerators that are built? You are not
23 telling me that you are not taking responsibility for
24 that decision, I presume?

25 A. Any more than the decision that

1 Ontario Hydro may buy other forms of non-utility
2 generation will affect the numbers that are built, yes.
3 But we don't take responsibility for the number of
4 non-utility generators that are going to be in the
5 province.

6 Q. Well, let me ask the question because
7 you have compared it to the situation with other NUGs,
8 and I want to know the situation for incinerators.

9 Again, you have agreed that Hydro's
10 decision to purchase electricity from these
11 incinerators might well affect the number that are
12 built. Are you saying it is not Hydro's responsibility
13 to consider the effect of those that are built or --

14 A. I don't see that it is. We are
15 working under a premise that says that the province has
16 lifted the ban on incineration; therefore, presumably
17 the Government of Ontario thinks it is a reasonable
18 thing to do. What would be wrong in building energy
19 from waste facilities?

20 Q. I see. So that if the province
21 decided to lift the ban you would think that basically
22 answered the question of whether or not Hydro should
23 purchase incinerator electricity?

24 A. Yes.

25 Q. And no further consideration of the

1 effects of additional incinerators is required?

2 A. From my perspective, that is correct.

3 Q. Thank you.

4 MR. SHALABY: A. It may be helpful to
5 remind you that previous governments encouraged energy
6 from waste projects. We have been subjected to policy
7 directives in the past to buy electricity from energy
8 from waste conversion projects.

9 Q. Thank you. I understand you are
10 subject to policy, which you may sometimes see as
11 whims, but -- well, I have my answer. Thank you.

12 THE CHAIRMAN: My understanding is - and
13 perhaps just to make sure I understand it - that as far
14 as non-utility generation is concerned, in general and
15 municipal solid waste in particular, Hydro doesn't
16 concern itself with the environmental consequences of
17 that particular operation. That is a matter that they
18 leave to the regulatory authorities to control.

19 Is that a fair statement?

20 MR. SHALABY: Yes, sir.

21 THE CHAIRMAN: Now, everyone may not
22 agree with that, but that, I think, has been their
23 evidence throughout this hearing.

24 MR. KLIPPENSTEIN: Thank you. That was
25 part of my question: What is their position?

1 Q. Now, in the evidence given by Mr.
2 Brown in Panel 5, I will quote a few words from him
3 just to see whether you agree with his position.

4 He said that this technology, meaning the
5 MSW incineration, at the present time "appears to be
6 acceptable". Is that Hydro's position, that the
7 technology at the present time appears to be
8 acceptable?

9 MR. DAWSON: A. In what context? Was
10 that from an environmental point of view, or from a
11 reliability point of view, or from what point?

12 Q. That is what I want to know, and
13 perhaps I could refer to the transcripts if those are
14 available. I don't know if you have the transcripts
15 available from...

16 THE CHAIRMAN: Do you have the volume?

17 MR. KLIPPENSTEIN: Yes, I realize I have
18 the page number, but not the volume.

19 THE CHAIRMAN: You have the page number,
20 but not the volume?

21 THE REGISTRAR: You asked for 67 and 76.

22 MR. KLIPPENSTEIN: Okay. 67 would be the
23 volume number.

24 THE REGISTRAR: 67 and 76 you asked for.

25 MR. KLIPPENSTEIN: Thank you.

1 Q. I'm sorry, do you have the
2 transcripts available?

3 MR. DAWSON: A. No, we don't. But if
4 you read it to me...

5 Q. I am reading from page 12113 of the
6 evidence-in-chief of Mr. Brown, and he said:

7 While recycling will reduce the
8 amount of MSW available for incineration,
9 the degree of reduction is unlikely to
10 eliminate it. An element of MSW will be
11 included in the later years of the plan.
12 The reason we are doing this is because
13 this technology at the present time
14 appears to be acceptable, and it also
15 depends on the success of current
16 recycling programs.

17 I guess my question is: Does Hydro view
18 the technology as acceptable?

19 A. Yes, I think in that context Mr.
20 Brown would be talking about it being acceptable from
21 the point of view of reliability of supply and in terms
22 of cost. And from that point of view, I think it would
23 be acceptable to Ontario Hydro.

24 Q. So those are the bases of the
25 decision? Reliability and cost would be what would be

1 meant?

2 A. Given that we would not be the
3 proponent and the proponent would obtain the necessary
4 environmental approvals.

5 Q. I think this is obvious, but would
6 you agree that the government doesn't consider the
7 incinerators acceptable?

8 A. Would I agree, sorry, that...

9 Q. Would you agree that the government
10 does not consider incinerators --

11 A. Does not consider? Right now that is
12 correct.

13 Q. Would you agree that there is a
14 significant segment of the public which doesn't
15 consider incinerators acceptable and this results in
16 large problems siting them? Would you agree with that?

17 A. Yes, I would.

18 Q. I would like to ask some questions
19 about the technology, and first looking at some
20 existing Ontario incinerators if I could direct you to
21 Exhibit 344, page 164.

22 A. Did you say 164?

23 Q. Yes. Sorry, I think I have that page
24 wrong. No, that is correct, 164.

25 There is a discussion of capacity factor.

1 Am I correct in understanding that capacity factor is
2 the percentage of design throughput that the
3 incinerator actually achieves over a significant period
4 of time?

5 A. Yes, that is correct.

6 Q. If I look at paragraph 6.5.2.4, there
7 is a reference to a mass burning plant at Milbury,
8 Massachusetts, and it is stated that the capacity
9 factor based on throughput is 85 to 90 per cent.

10 A. That is right.

11 Q. I take it that means that that
12 particular plant burns approximately 85 to 90 per cent
13 of the waste for which it was designed?

14 [3:07 p.m.]

15 A. That's right.

16 Q. And then if I go to the next
17 paragraph, it says:

18 This performance is representative of
19 other modern mass burning plants.

20 Can you explain that, please?

21 A. I think that is simply saying that
22 that capacity factor of 85 to 90 per cent is typical of
23 what you would expect to see other modern mass burning
24 plants achieve.

25 Q. Okay. Do you know what the source

1 for saying that that is representative is?

2 A. I think it is just general
3 experience. I know we did check specifically with the
4 Massachusetts plant and that is certainly what they are
5 achieving. They have confirmed that to us.

6 Q. But do you have a table or a list of
7 other plants achieving 85 to 90 per cent capacity
8 factor? Frankly, I have gone through, I think, every
9 document related to this or referenced and I see no
10 such --

11 A. I don't know that we have a specific
12 table.

13 Q. Can you give me one --

14 A. I can go back to 1979 and I visited a
15 number of plants in Europe at that time and certainly
16 most of those were achieving high capacity factors.

17 In fact, I think I am correct in saying
18 one achieved over 100 per cent capacity factor because
19 the heating value had gone down in the refuse and it
20 was, therefore, able to burn more refuse that had a
21 lower heating value than it was actually designed for
22 in terms of actual tonnage.

23 Q. These plants that you referred to in
24 '79, were they mass burn plants?

25 A. Yes, they were mass burn plants in

1 Paris and in Berne in Switzerland. I am trying to
2 think - Frankfurt, Berne -- where else? I forget, but
3 certainly in Paris and in Berne.

4 Q. Have you seen or heard of any North
5 American plants that achieve 85 to 90 per cent capacity
6 factor?

7 A. I haven't kept track specifically,
8 other than the one that is quoted here. I personally
9 haven't been keeping track of it.

10 Q. Well, I am wondering what the basis
11 for this statement is.

12 Is there something more to it or is this
13 just a general impression; and if it is a general
14 impression, whose general impression is it? Can you
15 enlighten me on that?

16 A. Well, I think the statement was made
17 by the people who are looking at that issue within
18 Ontario Hydro. There is a group in the design
19 department. One of their responsibilities is to keep
20 track of MSW energy from waste recovery along with
21 other alternative energy options and that is where the
22 statement would have come from. I imagine that they
23 have got some documentation to back it up, but I can't
24 say that I know specifically that they have.

25 Q. I wonder if you could undertake to

1 provide me with what the basis of that first half of
2 paragraph sub 5 is.

3 A. Yes, I could.

4 THE CHAIRMAN: I am not quite sure. Why
5 do you need to have this particular piece of
6 information that? Are you suggesting that this is
7 overstated, or?

8 MR. KLIPPENSTEIN: Yes.

9 THE CHAIRMAN: Oh. And you have some
10 examples that show it to be overstated?

11 MR. KLIPPENSTEIN: I will go through
12 some, yes.

13 THE CHAIRMAN: Well, then, perhaps that
14 would be the way to go about it rather than getting an
15 undertaking.

16 MR. KLIPPENSTEIN: All right. Why don't
17 I do that? It may be appropriate for me to request the
18 undertaking again thereafter.

19 THE CHAIRMAN: Well, it may be, Mr.
20 Klippenstein.

21 MR. KLIPPENSTEIN: Q. All right. If you
22 could then pull out from the materials I provided to
23 you a report from Ontario Hydro dated July 1989.

24 THE CHAIRMAN: Is that an exhibit that we
25 are looking at?

1 MR. KLIPPENSTEIN: It is a response to an
2 interrogatory. It has not been made as an exhibit that
3 I know of.

4 THE CHAIRMAN: Have you put it in as a
5 package yet? Have we got it?

6 MR. KLIPPENSTEIN: Yes.

7 THE REGISTRAR: Which one is it?

8 MR. KLIPPENSTEIN: One moment, please.

9 THE REGISTRAR: The interrogatory number,
10 please?

11 MR. KLIPPENSTEIN: It is an answer to
12 interrogatory 8.19.2. It looks like this (indicating).

13 THE REGISTRAR: 8.19.2 is 475.22.

14 ---EXHIBIT NO. 475.22: Interrogatory No. 8.19.2.

15 THE CHAIRMAN: Thank you.

16 MR. KLIPPENSTEIN: I believe I have
17 provided some copies and perhaps they can be
18 distributed to the panel.

19 MR. HOWARD: That wasn't in the package
20 we were given.

21 THE CHAIRMAN: Perhaps if there is a
22 package, Mr. Lucas, you can give us each a package and
23 as you come along, we can pull them out.

24 THE REGISTRAR: Perhaps that would be a
25 better idea, yes.

1 MR. KLIPPENSTEIN: Q. All right. If you
2 have managed to locate it, this is a report from
3 Ontario Hydro dated July 1989 and it is report Nos.
4 89171. It appears to be one of the references in
5 Exhibit 344 that is listed on page 176. But anyway,
6 what I have provided is not the entire report because
7 the report is fairly substantial. It is just some of
8 the pages I would like to refer to.

9 Okay, I would like to ask you some
10 questions about the capacity factor of some of the
11 plants referred to here and perhaps you could turn to
12 page 26 of this report, which is table 3.7.

13 Do you have it?

14 MR. DAWSON: A. Table 3-7?

15 Q. Yes.

16 A. Yes.

17 Q. Now, that is a description of a
18 particular incinerator; is that correct?

19 A. Chicago Northwest Waste to Energy
20 Facility, yes.

21 Q. And if I look under the heading of
22 technical description of incinerator plant, I see a
23 line called plant design capacity, 1600 tonnes?

24 A. Yes.

25 Q. And the next line is called Average

1 Current Plant Throughput.

2 Now, if I divide the tonnage figure of
3 current plant throughput by the design capacity, I
4 would get the capacity factor; is that right?

5 A. Yes.

6 Q. Okay, let's do that for that. I
7 divide 975 by 1,600 and I get 61 per cent?

8 A. Right.

9 Q. Okay. If you could turn the page to
10 table 3-9, and that shows an incinerator in Montreal.
11 And again, doing the same thing, comparing the current
12 average plant throughput with the plant design capacity,
13 I divide 775 by 1,200 and I get 65 per cent; is that
14 right?

15 A. Something like that, yes.

16 Q. Okay. And if I turn the page to
17 table 3-10, I have a Quebec City incinerator with a
18 design capacity of 1,000 tonnes and an unknown
19 throughput; do you see that?

20 A. Yes.

21 Q. Now, however, I can find the
22 throughput if I go back to Exhibit 344 and turn to page
23 163. Perhaps you could do that.

24 A. Sorry, where have you gone back to?

25 Q. Exhibit 344, page 163.

1 A. All right.

2 Q. And do you see figure 6-4-4?

3 A. Yes.

4 Q. Which includes a column of tonnes per
5 day.

6 And am I correct in believing that is the
7 throughput of the various plants?

8 A. I would take it that that is what
9 that means, yes.

10 Q. Okay. And if I look at the Quebec
11 City plant, I see that the tonnes per day of throughput
12 is 535; is that right?

13 A. Yes.

14 Q. Now, if I take that figure of 535, go
15 back to my table 310 and divide 535 by 1,000 of the
16 design capacity, I would get the percentage of -- my
17 calculation shows 66 per cent?

18 A. Something close to that, yes.

19 Q. Okay. If we could flip the page,
20 table 3-10 on the July 1989 report.

21 A. Which table, sorry?

22 Q. I am sorry, table 3-11.

23 A. Right.

24 Q. And I do the same thing for the
25 figures there, I get a capacity factor of 80 per cent,

1 is that right, taking the 1,200 and dividing it by
2 1500?

3 A. Yes.

4 Q. And then again, going on to table
5 3-12, I get a throughput of 180 tonnes and a design
6 capacity of 360 for a capacity factor of 50 per cent,
7 right?

8 A. Correct.

9 Q. Okay. The next table, 3-13, I do the
10 same thing and I get a capacity factor of 49 per cent;
11 does that look reasonable?

12 A. Yes.

13 Q. Going on to the next, which is table
14 3-14, I get a capacity of 38 per cent; does that look
15 reasonable - 60 divided by 160?

16 A. 160, yes.

17 Q. And the next incinerator, table 3-15,
18 this maybe one you visited, I get a capacity factor of
19 96 per cent?

20 A. That's right.

21 Q. Does that look right? And again,
22 table 3-16, I get a capacity factor of 96 per cent?

23 A. Yes.

24 Q. And table 3-17, I get a capacity
25 factor of 7 per cent; does that look about right?

1 A. That's right.

2 Q. Now, as far as I can tell, those are
3 all the incinerators described in this report. And
4 when I average out all the capacity factors, I get 61
5 per cent; would you disagree with that?

6 A. No, I wouldn't disagree with that,
7 no.

8 DR. CONNELL: Just for the record, is
9 that a numerical average or a weighted average?

10 MR. KLIPPENSTEIN: It is a numerical
11 average.

12 Q. If I could then ask you to turn to
13 another report which is also a response to an
14 interrogatory, and this is a report from Ontario Hydro
15 dated December 1989, and it is one of the responses to
16 interrogatories provided to you. The report No. is
17 89135 --

18 THE CHAIRMAN: Does it have a number?
19 I am sorry, the interrogatory number?

20 MR. KLIPPENSTEIN: I am sorry, it is
21 Interrogatory 5.19.4.

22 THE REGISTRAR: 5.19.4?

23 MR. KLIPPENSTEIN: Yes.

24 THE REGISTRAR: That is 475.23.

25 ---EXHIBIT NO. 475.23: Interrogatory No. 5.19.4.

1 MR. KLIPPENSTEIN: Q. Now, if you have
2 found that report, it is obviously an Ontario Hydro
3 report on the subject of municipal solid waste, if you
4 could turn to page 7 and review the second paragraph
5 which says:

6 Figure 3-1 depicts a typical modern
7 mass burning plant built by Martin
8 Systems in Marion County, Oregon, U.S.A..
9 This particular installation is a good
10 example of the efficient and safe use of
11 this technology. It generates 11
12 megawatts of electricity from 360 tonnes
13 of MSW per day.

14 Now, I am going to ask you to figure out
15 the capacity factor of that typical, modern, efficient
16 mass burning plant. And fortunately, I have the design
17 capacity in the July 1989 report which we just looked
18 at. If you could pull that report out again and turn
19 to page 30.

20 THE CHAIRMAN: Sorry, number, page?

21 MR. KLIPPENSTEIN: Page 30. It doesn't
22 have a page number. It has figure 3.5 on it which is a
23 picture of a plant. Page No. 31 is on the reverse of
24 it.

25 THE CHAIRMAN: This is in the last

1 interrogatory we did, is it?

2 MR. KLIPPENSTEIN: That's right.

3 THE CHAIRMAN: Well --

4 MR. DAWSON: I don't have a figure 3-5 in
5 my --

6 THE CHAIRMAN: The pages are not in
7 order.

8 MR. DAWSON: I have got figure 3-1 and
9 table 3-7 and then figure 3-6.

10 MR. SMITH: It is after page 58 at the
11 back.

12 THE CHAIRMAN: It is towards the back of
13 the document.

14 Is there one with a picture on it?

15 MR. DAWSON: All right.

16 MR. KLIPPENSTEIN: I apologize, there
17 appear to be copying problems there.

18 Q. You found it? It is labelled --

19 MR. DAWSON: A. I found figure 3-5, yes.

20 Q. Okay. Thank you.

21 Now, it appears to me that the
22 incinerator described in that box is the same one
23 -- described on page 7 of the December '89 report.

24 Can you accept that?

25 A. I would agree that that is likely the

1 same incinerator, yes.

2 Q. Okay. Now, if we take the 360 tonnes
3 per day that it is processing and multiply that times
4 365 days, I get a figure of 131,000 tonnes per year
5 from the processing; does that sound fair?

6 A. You multiply 360 by?

7 Q. 365 days times 360 tonnes.

8 MR. SHALABY: A. It gives the capacity
9 right there if that is what you want to arrive at, 550
10 tonnes per day.

11 Q. Yes, I realize that. That is not
12 exactly what I am looking at now. Thank you.

13 MR. DAWSON: A. And you have got
14 131,400; is that what you are talking about.

15 Q. That's right. And would you agree
16 that is the amount the plant is burning according to
17 page 7 of --

18 A. Yes.

19 Q. Okay. If you look at the other
20 report, it has a design capacity of 170,000 tonnes per
21 year; do you see that?

22 A. Right.

23 Q. Now, if I divide 131,400 which it is
24 actually burning with the 170,000 that it is designed
25 to burn, I get a capacity factor of 77 per cent?

1 A. Right.

2 Q. You will notice that under there, it
3 also says that the guaranteed waste delivery is
4 145,000, so it may well be that the waste isn't being
5 delivered to the plant as opposed to the technical
6 capability of the plant to burn the waste. We don't
7 know what the reasons are for the capacity factors
8 being that low.

9 Q. Fair enough. The bottom line is,
10 that is the capacity factor?

11 A. Right, yes.

12 Q. Now, keeping in mind that that is
13 described to be a typical modern and efficient plant,
14 there seems to be a bit of a discrepancy between that
15 and the 85 to 90 per cent that is described as
16 representative in Exhibit 344.

17 Can you account for that difference?

18 A. Well, I think the difference is that
19 we were talking about technical capability as opposed
20 to what may be looked on as being some actual
21 experience that is based on economic feasibility in the
22 States, too.

23 I am saying we don't know what the
24 reasons are and it may be in some instances that the
25 refuse simply isn't delivered to the plant. It doesn't

1 have the refuse to burn. It doesn't mean it isn't
2 technically capable of operating at 85 to 90 per cent
3 capacity factor. We saw there are some examples in
4 there that, in fact, do operate at that capacity
5 factor. So I think technically, it is feasible, so it
6 is more likely to be an economic issue.

7 [3:27 p.m.]

8 Q. Considering the review of the number
9 of incinerators in Hydro's own report and in the
10 capacity factor of this allegedly efficient plan, I
11 wonder if it is fair for me to ask for an undertaking
12 to provide evidence or to provide the background for
13 that statement that 85 to 90 per cent capacity factor
14 is representative.

15 MR. HOWARD: Well, an undertaking to
16 provide evidence? You have got the evidence. If you
17 use the 145 and 170 in the last example that is what
18 you get, 85 per cent. You have got some 90s. You have
19 already got Mr. Dawson's evidence.

20 THE CHAIRMAN: I am not sure I followed
21 you on that last one.

22 MR. HOWARD: Well, Mr. Dawson has just
23 said that it comes from the technical capability, the
24 technology is capable of it. If they don't get the
25 waste obviously they don't perform up to that.

1 THE CHAIRMAN: I am not sure how the
2 undertaking helps you or helps us deal with the issues
3 we have to deal with.

4 MR. KLIPPENSTEIN: Let me state it this
5 way.

6 The one-line reference in Exhibit 344
7 seems to be quite out of line with most of the other
8 evidence that Hydro has provided, and there is no data,
9 no description of where that capacity factor figure
10 comes from, and that capacity figure is used in
11 calculating the economics of the plans.

12 THE CHAIRMAN: And you are suggesting
13 that the capacity factor is lower than that or it is
14 lower than what they have said it was?

15 MR. KLIPPENSTEIN: Yes, I am suggesting
16 that the 85 to 90 per cent is not-representative.

17 MR. SHALABY: The figure used in
18 calculating cost is 80 per cent, just for the record,
19 and I think the evidence in page 164 says this
20 performance is achievable, and Mr. Dawson is saying
21 there are a lot of other factors that prevent achieving
22 that. It could be delivery of the waste. We are
23 familiar with things that day, only weekday operation
24 is permitted, not weekend operation.

25 So the technology may be there capable of

1 achieving that, but it doesn't achieve it for a number
2 of reasons. Similar to our Lennox plant.

3 It is designed to operate at a high
4 capacity factor, but we choose to operate it at 5 or 10
5 per cent of the time.

6 THE CHAIRMAN: I notice that the Marion
7 plant was rated at 13-point-something megawatts,
8 whereas it only produces 11 megawatts. So there would
9 be a variance in there as well.

10 DR. CONNELL: Do you have a working
11 hypothesis, Mr. Klippenstein? Do you think there is a
12 consistent design failure that accounts for this or
13 some other --

14 MR. KLIPPENSTEIN: Yes. It is my
15 conclusion based on - not that my conclusion matters -
16 but based on the evidence that these plants have a
17 continuing history of enormous technical problems, and
18 I am quite prepared to ask some more questions about
19 some other plants that demonstrate that.

20 I would like to know where these
21 extremely high figures came from and why are they
22 supposed to be representative of what could be expected
23 in Ontario, because I suggest the evidence shows the
24 opposite.

25 THE CHAIRMAN: Well, the statement says

1 this is just representative of other mass burning
2 plants, and we have some that fit that and some that
3 don't.

4 I think if you have got evidence to show
5 that their calculations are based on the wrong capacity
6 factor you should bring that evidence in when you put
7 your case in. I think they have given their best shot
8 at how they can answer it.

9 MR. KLIPPENSTEIN: Okay.

10 MR. SHALABY: If I could also provide a
11 little bit of context for this, when Hydro
12 characterizes alternative energy, be it solar or wind
13 or fuel cells, if we are going to pick on the poor
14 examples in industry we are going to get criticized as
15 picking the poor examples. This is sort of a first
16 when we pick the good examples we get criticized as
17 well.

18 If we pick the very worst windmills and
19 said how much they cost and how they don't work, well,
20 sure, there are windmills that have not worked since
21 they have been built. That is not the example we gave.
22 So again, it just goes to prove a witness never has a
23 winning proposal.

24 MR. KLIPPENSTEIN: I suspect, Mr.
25 Shalaby, if you picked the bad example I would still

1 criticize you.

2 MR. SHALABY: That is right.

3 MR. KLIPPENSTEIN: Q. Well, I will
4 proceed further on some of my questions without
5 specifically asking for that or pursuing that
6 undertaking.

7 Could you turn to example 344 again, page
8 163, paragraph .4, which refers to the SWARU plant in
9 Hamilton; is that correct?

10 MR. DAWSON: A. That is correct, yes.

11 Q. Now, it appears that that plant is
12 providing no net power, would you agree? It is
13 producing three and using up 3 megawatts?

14 A. That is right. It was never designed
15 to produce any net power.

16 Q. The next sentence says that redesign
17 of the plant is on-going and it should produce
18 approximately 1 megawatt of net power after the
19 currently planned steam utilization improvements are
20 implemented?

21 A. That is right.

22 Q. So that redesign is intended to
23 produce electricity; is that right?

24 A. To the extent of 1 megawatt, yes.

25 Q. So I take it from what you are saying

1 the SWARU plant is not being proposed as a good example
2 of an electricity-producing incinerator?

3 A. No, it is certainly not an optimized
4 design from that point of view.

5 Q. If you could turn back to the
6 December, '89 report we reviewed recently and turn to
7 page 9, the top paragraph says:

8 The starved air incineration system
9 has been successfully used in Ontario in
10 an industry, at a hospital and by a
11 municipality.

12 I take it that that hospital would be the Victoria
13 Hospital in London; is that right?

14 A. I don't know, to be honest. I
15 thought the Victoria Hospital had a standard mass burn
16 facility in there. I don't think that that is what
17 this is talking about, but I --

18 Q. Well, if you can turn the page to
19 table 5-1 there is a list of existing --

20 A. Which page are you looking at now?

21 MS. PATTERSON: Table 5-1.

22 MR. KLIPPENSTEIN: Q. Table 5-1 on page

23 14.

24 MR. DAWSON: A. All right. Right.

25 Q. The Victoria Hospital incinerator is

1 listed there. Do you see it?

2 A. Right.

3 Q. And under Combustion Technology it is
4 described as two-stage combustion?

5 A. Right.

6 Q. And would you agree that that
7 suggests that it is in fact the hospital that --

8 A. Yes. Okay.

9 Q. Okay. Now, back to page 9, the
10 paragraph says:

11 These systems have been proven to
12 perform well with minimum maintenance
13 problems and are considered to be a good
14 alternative for small municipalities and
15 some large industries.

16 And that includes the Victoria Hospital incinerator
17 that they are describing there; is that right?

18 A. Yes, I would agree to that, yes.

19 Q. If you could turn to another document
20 I have provided to you with a document summary at the
21 beginning, and it is entitled, Municipal Waste
22 Incinerator Throws Province for \$13 million Loss.

23 THE REGISTRAR: That will be Exhibit No.
24 488.

25

1 ---EXHIBIT NO. 488: Document summary entitled,
2 Municipal Waste Incinerator Throws
 Province for \$13 million Loss.

3 MR. KLIPPENSTEIN: Q. There is an
4 article -- excuse me, that is a copy of an Ontario
5 Recycling Update for December, 1991. Have you seen
6 this publication before?

7 MR. DAWSON: A. No.

8 Q. If I could refer you to the article
9 on the front page of that piece, and the third
10 paragraph says: Since opening -- excuse me. Would you
11 agree that this article refers to London's Victoria
12 Hospital?

13 A. Yes.

14 Q. And the third paragraph says:

15 Since opening in 1987 the facility
16 has lost in excess of \$13 million.

17 You haven't reviewed this before, but do you have any
18 knowledge about whether or not the facility has lost
19 \$13 million?

20 A. I understand that it is in trouble,
21 and I don't know the precise reasons why. Part of that
22 reason is that they did have problems in disposing of
23 the ash in the way that they had planned initially.

24 Q. I see.

25 A. I think it had to go to a hazardous

1 waste landfill. There was some problem of that sort.
2 It says here that that has added half a million dollars
3 annually to the cost of ash disposal.

4 Q. Okay. If you could --

5 A. Yes, and I have a feeling it was also
6 oversized in relation to the amount of waste that was
7 actually received, but I am not totally sure about
8 that.

9 Q. If you look at the second column, the
10 second full paragraph, the article says that the plant
11 is currently operating just one incinerator at partial
12 capacity burning curb side waste. That lines up with
13 what you have just said to some extent?

14 A. Yes.

15 Q. And they quote a hospital
16 spokesperson that says the operation is still losing
17 money. You don't have any evidence one way or the
18 other on that, I take it?

19 A. Do I have any what, sorry?

20 Q. Evidence on that point one way or the
21 other?

22 A. No, I don't. No.

23 Q. If I could change the topic for a
24 little bit and go back to something you mentioned
25 earlier, which was the effect of the three Rs on the

1 waste that an incinerator will burn, and if I could
2 refer you to another document I have provided to you,
3 entitled Ontario's Policy on Incineration, Appendix G,
4 and I propose that it be -- it is the Ontario's Policy
5 on Incineration, Appendix G.

6 Perhaps the Panel has it already?

7 THE CHAIRMAN: Not unless it is an
8 interrogatory.

9 THE REGISTRAR: This is an interrogatory?

10 MR. KLIPPENSTEIN: No.

11 THE CHAIRMAN: No.

12 THE REGISTRAR: Ontario's Policy on
13 Incineration, Appendix G?

14 MR. KLIPPENSTEIN: Yes.

15 THE REGISTRAR: That will be Exhibit No.
16 489.

17 ---EXHIBIT NO. 489: Ontario's Policy on Incineration,
18 Appendix G.

19 MR. KLIPPENSTEIN: Q. Now, this
20 Appendix G, a table of waste composition, is taken from
21 Ontario's Policy on Incineration, which is listed in
22 Exhibit 344 as additional reading on page 176. So that
23 is the source.

24 Do you see the column entitled, Current
25 Composition of MSW?

1 MR. DAWSON: A. Yes.

2 Q. And at the bottom of that column is
3 an indication of the heat per pound, which is given as
4 5,210 btus per pound; do you see that?

5 A. That is right, yes.

6 Q. Would you agree that the column on
7 the right is the composition of MSW after 50 per cent
8 diversion through the three Rs?

9 A. Yes.

10 Q. And the btu per pound has decreased
11 to 4,300?

12 A. That is right.

13 Q. A reduction of something like 17 per
14 cent, I think?

15 A. Yes.

16 Q. Now, did Hydro factor into Exhibit
17 344, its report, any calculation on the effect of
18 recycling on the actual composition and heat content of
19 the waste? Is any analysis or compensation made for
20 that in 344, or do you disagree with that?

21 A. I don't think our report went into
22 that sort of detail.

23 From an incineration point of view, a
24 reduced heating value is not necessarily a bad thing,
25 though, in that what it means is you need more tonnage

1 to produce the same amount of heat to produce the same
2 amount of steam, so that providing the tonnage is there
3 then you have got a greater throughput from the same
4 incinerator and therefore more revenue from tipping
5 fees.

6 So, it is not necessarily a bad thing
7 from a refuse incinerator revenue point of view.

8 Q. But let's go back to the community of
9 50,000 that we were discussing earlier on. If a three
10 R program is installed the net result will be the
11 incinerator gets less heat, assuming there is a fixed
12 amount of waste there.

13 A. If you have got a limited amount of
14 refuse available, then the heating value has gone down
15 and therefore your generation of electricity would
16 reduce as a result of that, that is true.

17 But if you don't have a limited amount of
18 refuse, if you are in somewhere like Metro Toronto
19 where there is more refuse available than incinerator
20 capacity, then it is not necessarily a problem.

21 Incidentally, I think in that December,
22 '89 report that you referred to, Exhibit 475.23, we do
23 have a reference to heating value and we quote a value
24 of 4,500 btu per pound, so we are not too far off the
25 value that you were quoting after recycling.

1 Q. Can you tell me what page that would
2 be?

3 A. That is page 4 of the copy that you
4 left with us, under section 2, Production and
5 Characteristics of Municipal Solid Waste.

6 Q. Yes, I see it. Thank you.
7 Unfortunately, I haven't photocopied table 2.1.

8 THE CHAIRMAN: Could we take a break now?

9 MR. KLIPPENSTEIN: That would be
10 acceptable.

11 THE CHAIRMAN: Would that be
12 satisfactory? We will take a break for 15 minutes.

13 THE REGISTRAR: The hearing will recess
14 for 15 minutes.

15 ---Recess at 3:45 p.m.

16 ---On resuming at 4:06 p.m.

17 THE REGISTRAR: This hearing is again in
18 session. Be seated, please.

19 THE CHAIRMAN: Mr. Klippenstein?

20 MR. KLIPPENSTEIN: Thank you.

21 Q. If I could ask you to turn to Exhibit
22 344, page 170, I have some more questions about the
23 costs of incinerators.

24 Would you agree with me that one of the
25 costs of operating the incinerator is the cost of

1 disposing of the ash at a landfill site usually; is
2 that right?

3 MR. DAWSON: A. Right.

4 Q. And that cost would have been
5 included in your cost estimates under one of these
6 categories? Would that be under OM&A?

7 A. That would be under the OM&A, yes.

8 Q. Okay. If I turn to page 170,
9 paragraph 6-10-3.2, the report says:

10 The cost estimates are developed based
11 mainly on reports commissioned by Ontario
12 Hydro and prepared by experts in the
13 field.

14 Now, Pollution Probe asked in an
15 interrogatory what reports were being referred to
16 there. And in the response to Interrogatory 8.19.9
17 which I provided but you may not need to look at --

18 THE CHAIRMAN: Well, we will go through
19 the ritual.

20 8.19.9 is?

21 THE REGISTRAR: 8.19.9 is .24.

22 THE CHAIRMAN: .24?

23 THE REGISTRAR: Yes.

24 ---EXHIBIT NO. 475.24: Interrogatory No. 8.19.9.

25 MR. KLIPPENSTEIN: Q. In that response,

1 two reports are listed as the source of that costing
2 information.

3 MR. DAWSON: A. Did you say that was one
4 of the pieces of information you provided?

5 Q. Yes. I have provided to you a
6 photocopy of the response to Interrogatory 8.19.2.

7 A. Right, yes. I remembered that I
8 think that statement, in fact, was in there in error
9 for MSW because it was something that was used in--

10 Q. Right.

11 A. --the other sections of the report.

12 Q. Right. I didn't take that to be a
13 major problem, but the point is that those two reports
14 listed on that response are the source of the
15 costing

16 A. Right.

17 Q. Okay. If I could then ask you to
18 turn to the July '89 report given as one of the bases
19 for the costs, and it is the report we looked at
20 earlier.

21 MR. HOWARD: 475.22.

22 MR. KLIPPENSTEIN: Yes. Thank you.

23 Q. If you would turn to page 24 of that
24 report, the very last paragraph, the report says -- I
25 am sorry, I will wait. The very last paragraph of page

1 24 says that:

2 The volume reduction - I am
3 paraphrasing here - the volume reduction of the MSW by
4 weight -- excuse me -- the weight
5 reduction can be in excess of 70 per
6 cent.

7 MR. DAWSON: A. Yes.

8 Q. From my reading of these reports, the
9 30 per cent remainder, being ash, is kind of the figure
10 that is used throughout; is that correct?

11 A. That is probably reasonable, yes.

12 Q. Okay. If you could keep that same
13 report and turn to table 8-1, which is entitled,
14 "capital and operating costs used for TUEC and LCPW
15 calculations".

16 A. Right.

17 Q. Now, this works through some of the
18 costs and the revenue of the incinerator; is that
19 right?

20 A. Yes.

21 Q. And it is based on a refuse capacity
22 of 6300 megagrams?

23 A. Right.

24 Q. Now, if I take that 6300 and assume
25 that 30 per cent of it will remain as ash, let me work

1 through some calculations. 30 per cent of 6300 times
2 365 days, I get a total amount for the year of
3 remaining ash as 689,850 megagrams, I guess it is; is
4 that fair? Am I correct so far in that calculation?

5 A. The number was what, sorry?

6 Q. If I take 30 per cent of 6300, it
7 gives me the ash per day?

8 A. Right.

9 Q. And 365 days would give me the ashes
10 per year by weight of 689,850 megagrams, right?

11 DR. CONNELL: Mr. Klippenstein, where
12 does it say that the 6300 is the capacity per day? Is
13 that implied somewhere?

14 MR. KLIPPENSTEIN: I believe it is in the
15 text somewhere.

16 MR. DAWSON: On the table, in the column
17 right on the left, it says "generation capacity" and
18 then it says "refuse capacity" and it has 6300
19 megagrams. It doesn't say per day, but I think it is a
20 fair assumption.

21 MR. KLIPPENSTEIN: Q. So I have
22 calculated a reasonable estimate of ashes by way of
23 689,850?

24 MR. DAWSON: A. Right.

25 Q. That is reasonable?

1 If I then look at the tipping fee that is
2 assumed here of \$50, that would apply to the ashes that
3 have to be disposed of; is that right? That is one of
4 the assumptions here. That is what people pay to bring
5 material to this plant and it is fair to assume that is
6 what the plant would pay to dispose of their ashes; is
7 that right?

8 A. On the face of it, it would seem like
9 a reasonable assumption, yes.

10 Q. In fact, quite possibly, the ash
11 would be hazardous waste and the cost might be higher,
12 but the \$50 would be reasonable?

13 A. Yes.

14 Q. Now, if I work through that
15 calculation and multiply the 689,850 megagrams by \$50,
16 I get approximately \$34.5 million disposal cost for
17 ashes per year?

18 A. Right.

19 Q. Is that fair enough?

20 A. Yes.

21 Q. Now, however, the figure I see listed
22 here for ash disposal cost is 8.7 million rather than
23 34.5 million. That appears to be a discrepancy.

24 A. Is 12.7; is that what you said?

25 Q. Yes. The figure I got was \$34.5

1 million.

2 A. Right, based on \$50 for tipping fee.

3 Q. That is right.

4 A. And you are saying the OM&A cost in
5 there is --

6 Q. I am looking at the line entitled,
7 "ash disposal cost".

8 A. Oh, I am sorry, yes, is 8.7, yes.

9 Q. So I have a difference of almost \$26
10 million in costs?

11 THE CHAIRMAN: I lost your calculation of
12 how you get to the -- just a million dollars disposal.

13 You multiply \$50; what is that?

14 MR. KLIPPENSTEIN: \$50 is the fee that
15 the plant must pay per megagram to dispose of the ash
16 at a landfill site.

17 THE CHAIRMAN: I see, oh, all right.

18 MR. KLIPPENSTEIN: That \$50 figure has
19 two functions: It is what people pay to the plant to
20 dispose of waste and it is what the plant pays to
21 dispose of its ashes.

22 THE CHAIRMAN: What the plant pays to
23 dispose of the ash?

24 MR. KLIPPENSTEIN: Yes.

25 THE CHAIRMAN: Is that correct, Mr.

1 Dawson?

2 MR. DAWSON: I am sorry?

3 THE CHAIRMAN: Is it correct to say that
4 the tipping fee is what the person who brings the waste
5 to the facility has to pay for the waste to deposit the
6 waste and what the operator has to pay to dispose of
7 the ash?

8 MR. DAWSON: I agree that it is a
9 reasonable assumption to suppose that the refuse
10 incinerator plant has to pay a similar fee to pay for
11 the disposal of the ashes as they are per charging as a
12 tipping fee.

13 THE CHAIRMAN: All right.

14 MR. DAWSON: Obviously that hasn't been
15 the assumption in the study and I can't think why it
16 wasn't at this point. I don't have an answer for you
17 you as to why that is a different value down there.

18 MR. KLIPPENSTEIN: Q. Would you agree
19 that is probably an error?

20 MR. DAWSON: A. I don't know whether it
21 is an error or whether there is some logic that I am
22 missing here. I could go back and find out. We may be
23 able to find out. It could well be an error, yes. It
24 could well be that it should be \$34 million.

25 Q. Well, leaving that as a question mark

1 then as to the cause of it, by my calculations, that
2 difference of some 26 million is approximately 22 per
3 cent of the revenue that this plant would be expected
4 to get.

5 A. Right.

6 Q. So if there is an error, this plant
7 is out 22 per cent of its revenue or rather, its costs
8 are 22 per cent higher than they thought or consumed 22
9 per cent of the revenue unexpectedly; would you agree
10 with that?

11 A. I am just looking for a -- I don't
12 see a revenue from --

13 Q. I think the revenue would be the line
14 entitled, "annual tipping fee".

15 A. There is a revenue from tipping fee.
16 I don't see a revenue from electrical generation though
17 either.

18 Q. There doesn't appear to be one, no.

19 A. So that is an error in the other
20 direction.

21 Q. Well, let's take this table 8.1
22 which, I believe, is the source of the calculations on
23 figure 8.2; can you confirm that? I think the text
24 says so, in fact.

25 A. Yes, I think that is right, yes.

1 Q. And am I right in thinking that
2 figure 8.2 is the source of the statement that the
3 incinerator or an incinerator, a typical incinerator,
4 will become profitable after about 17 years?

5 A. Yes, I think that is correct. It is
6 right here.

7 Q. Now, if there is this potential for
8 an error in the prior table that is the basis of this
9 report, we can't be too sure about that 17-year figure,
10 can we?

11 A. No. It could be a little bit more or
12 it could be -- well, depending on the value of the
13 electrical generation versus the error in the waste
14 disposal, it could be longer or shorter.

15 Q. And given that this report is the
16 basis for the calculations in Exhibit 344 on costs and
17 benefits, we can't be too sure about those costs and
18 benefit calculations anymore, can we?

19 A. Well, it was the basis for the
20 capital costs and there are some assumptions in there
21 yes; so, no, they could be out somewhat, yes, though I
22 think you have got to agree that there is a large
23 margin in terms of the cost benefit ratio -- well, that
24 assessment.

25 Q. Well, there may be, but this plant

1 appeared to be out 22 per cent of its revenue and
2 certainly we don't know how that error may have worked
3 its way into the calculations in Exhibit 344, do we?
4 We just don't know.

5 A. No, but I think it is clear to say
6 that at \$60 a tonne, when you have got a cost benefit
7 ratio of .5, that you would need a much bigger error
8 than that to make it uneconomical.

9 DR. CONNELL: We don't have tipping fees
10 in our calculations for fossil plants, do we, at least
11 not of the order of \$50 a tonne?

12 MR. DAWSON: No. The equivalent of the
13 tipping fee in the cost of the fossil plant is the
14 price of the coal, which is rather than being a
15 revenue--

16 DR. CONNELL: I am sorry.

17 MR. DAWSON: --is a net outlay.

18 DR. CONNELL: I mean at the other end for
19 the ash.

20 MR. DAWSON: There is an ash disposal
21 cost included in it.

22 DR. CONNELL: But it is much smaller than
23 \$50.

24 MR. DAWSON: It is much smaller because
25 it is on site.

1 DR. CONNELL: Is there any reason to
2 think that MSW should be different?

3 MR. DAWSON: Well, it appears that, in
4 fact, the assumption has been that there is a lower
5 cost being used in the \$50 a tonne, but whether it is a
6 valid assumption or not, I am not sure.

7 DR. CONNELL: Do you think the figure
8 used in table 8-1 is comparable to the costs at a coal
9 plant?

10 MR. DAWSON: I think it may well be, yes.
11 At \$50 a tonne, we were looking at \$34 million, so this
12 is something like a quarter of that, so we are looking
13 at 12.50 a tonne which is more than the cost they would
14 use in a coal plant, significantly more, maybe two or
15 three times more.

16 THE CHAIRMAN: I suppose it depends which
17 figure you accept; whether you accept the \$50 as being
18 applied to disposal or whether you accept the revenue
19 as being the actual cost and then apply it to the
20 estimated amount of ash that has got to be disposed of.

21 MR. DAWSON: Sorry, Mr. Chairman, I
22 missed your --

23 THE CHAIRMAN: Where is this table again?
24 I have lost it.

25 MR. DAWSON: It is near the end of the

1 89171 July 1989 report.

2 THE CHAIRMAN: Well, there are two
3 figures in there: One is tipping fee of \$50 and the
4 other is the ash disposal cost. One of them has got to
5 be wrong if the estimate of the disposable ash is
6 correct. So, it could be one or the other that is
7 wrong, I take it.

8 MR. DAWSON: Either that or there is an
9 assumption that the ash is being disposed of at some
10 other landfill site other than where the municipal
11 revenues would go and for some reason at the lower
12 cost. And at the moment, I can't throw any light on
13 that as to where the logic is for that, for that
14 number.

15 But to get back to the cost benefit ratio
16 in the report, we are saying it makes it -- what it
17 would do is, if we said the that the ash is 30 per cent
18 of the total refuse, then it would reduce that present
19 value of the tipping fee by 30 per cent. So instead of
20 being \$259 million for the \$60 tipping fee column in
21 table 6-10-5, it would reduce that by 30 per cent which
22 would be by \$75 million, so it would bring it up to
23 about \$185 million. So it is still going to be -- it
24 is going to be higher than .5 but less than .7.

25 MR. KLIPPENSTEIN: Q. And this plant

1 now, if I knock out the electricity factor here, this
2 plant which here is profitable would then no longer be
3 economic, right?

4 MR. DAWSON: A. Maybe.

5 MR. KLIPPENSTEIN: One moment, please.

6 MS. PATTERSON: While Mr. Klippenstein is
7 looking for something, Dr. Effer, could you give us any
8 information on the difference in the properties of ash
9 from an MSW plant and from a normal fossil burning
10 plant?

11 DR. EFFER: I think the composition of
12 the ash from the municipal solid waste would very much
13 depend on the composition of the waste itself and the
14 characteristics anyway would be very markedly
15 different. There is a significantly higher amount of
16 elements, metallic elements, in the municipal solid
17 waste ash product.

18 I think I covered this in some detail in
19 the direct evidence.

20 [4:28 p.m.]

21 MS. PATTERSON: So my point is I guess it
22 would be unlikely that it would be treated in the same
23 way as ash from a normal fossil plant in terms of the
24 disposal process?

25 DR. EFFER: I don't think it is likely

1 they would be treated the same way.

2 MR. KLIPPENSTEIN: Q. I would like to
3 ask a few questions about the payback period that we
4 just discussed, which was given as 17 years in some of
5 the reports, but which you agree now is somewhat
6 uncertain.

7 If you could turn to the July, 1989
8 report, page (iii)?

9 MR. SHALABY: A. I am wondering whether
10 we could get the entire report. There are a lot of
11 questions on this July, '89 that we could perhaps have
12 found the disposal assumptions if we had the full
13 report with us.

14 Are you intending to use it much more?
15 Should we attempt to get the entire report?

16 Q. I don't think so. I don't think it
17 is worth getting the report.

18 I can say that as far as I can tell there
19 is nothing else in the report that illuminates the
20 items we have discussed, but I could be wrong. But as
21 far as I know, there isn't.

22 MR. HOWARD: Here. We have the full
23 thing. It is in 8.19.2, one of the attachments. You
24 have the full thing there. Good luck on finding
25 anything in it. It is an immense thing.

1 MR. KLIPPENSTEIN: Q. If you could just
2 direct your attention to page (iii), the middle
3 paragraph?

4 The last sentence states that:

5 The fact that the payback period in
6 lifecycle present worth terms is around
7 the station half life makes an EFW plant
8 a less attractive generation option than
9 it would appear from either the TUEC
10 analysis or from the ultimate LCTW
11 savings achieved over 30 years.

12 Am I correct that the long payback period
13 is a problem because it increases the financial risk?

14 MR. DAWSON: A. Yes.

15 Q. It increases the risk through
16 uncertainty, things could happen over that long period;
17 is that right?

18 A. That's right.

19 Q. Now, I will ask some other questions
20 about some of the economics. If you could turn to
21 Interrogatory Response 8.19.3, which is in the package
22 provided but we haven't reviewed it yet...

23 THE CHAIRMAN: 8.19.3 will be what
24 number?

25 THE REGISTRAR: Number 25.

1 THE CHAIRMAN: Thank you. .

2 ---EXHIBIT NO. 475.25: Interrogatory Response 8.19.3.

3 MR. KLIPPENSTEIN: Q. Now, this
4 interrogatory requested whether Hydro considered the
5 potential for significant capital cost increases for
6 incineration due to future stiffer pollution control
7 regulations.

8 I gather the answer is that such stiffer
9 regulations might result, but they have not been
10 evaluated or included in the cost of the equipment
11 considered here; is that fair?

12 MR. DAWSON: A. No, though it is my
13 understanding it has what is currently state of the art
14 control technology on the back end. It has a spray
15 dryer, scrubber and a baghouse.

16 Q. All right. If I can turn to Exhibit
17 344 on the same topic and ask you to turn to page 166?

18 THE REGISTRAR: Mr. Chairman, I
19 apologize. 8.19.2 has previously been entered and it
20 is 22 --

21 MR. KLIPPENSTEIN: I was referring to --

22 THE CHAIRMAN: 8.19.3.

23 THE REGISTRAR: .3? So then that would
24 be .25.

25 MR. KLIPPENSTEIN: Q. If you look on

1 page 166 at sub-paragraph .13, there is a reference to
2 expensive but highly effective flue gas cleaning and
3 recycling systems which Europeans are using.

4 MR. DAWSON: A. Did you say 156 or 166?

5 Q. 166, sorry.

6 A. 166, I'm sorry. .13 says dry/wet
7 scrubber in combination with baghouse filters can be
8 used to reduce emissions of particulates. Yes.

9 Q. But the reference to equipment used
10 in Europe is in addition to those items; is that right?

11 A. I think that is a reference to the
12 Flakt system which also treats the waste. I am aware
13 of the fact that it treats the waste to produce a --
14 essentially, what it does is it heats the waste up,
15 remelts it so that it forms a glassy material with much
16 improved leaching characteristics over fly ash.

17 And I am not sure what else it means in
18 terms of improved flue gas cleaning. It may mean wet
19 scrubbing as opposed to spray dryers, which would bring
20 the gas temperature down by another 15 degrees possibly
21 and therefore may be more effective in terms of
22 condensing some emissions that are in the vapour state.

23 Q. But if that is what this paragraph
24 refers to, the Europeans are using it and it is
25 expensive, but it is not included --

1 A. It would be somewhat more expensive.
2 The flue gas cleaning side of it would be somewhat more
3 expensive, but it wouldn't be double the cost of what
4 we have already put on there.

5 Q. But it is not included in the cost?

6 A. No. What we have on there is the
7 wet/dry scrubbing in combination with a fabric filter.

8 Q. So that would be an example of more
9 expensive equipment which might be needed to meet
10 future regulations, and, in fact, the Europeans are
11 already using it?

12 A. Right.

13 Q. And you haven't included it in your
14 option plan?

15 A. No.

16 Q. And, in fact, the potential for
17 increased costs through future environmental
18 regulations is one of the reasons why the long payback
19 period is so risky; is that fair?

20 A. Yes, that is because a long payback
21 period is a problem in terms of future unknowns, and
22 that is one of the future unknowns, yes.

23 Q. If I could then change to a couple of
24 other points quickly, the claim is made that
25 incineration reduces the volume of the waste some 80 or

1 90 per cent; is that right?

2 A. Yes. We talked about 90 per cent by
3 volume, that is right. Yes.

4 Q. Now, if one were to compare that with
5 waste which doesn't go to an incinerator but goes to a
6 landfill site instead, would you agree that a
7 substantial amount of compression of that volume waste
8 occurs in a landfill site as well through settling and
9 packing?

10 A. Yes, there would be some compression,
11 yes.

12 Q. And it would be pretty substantial;
13 isn't it?

14 A. I don't know. I don't know what the
15 value is.

16 Q. So if you want to compare volume to
17 an incinerator and volume to a landfill site you have
18 to take into account the fact that some compression
19 occurs in a landfill as well?

20 A. That is true, yes.

21 Q. Then I have a couple of questions
22 about health issues and particularly about mercury
23 emissions from an incinerator.

24 If you could refer to another proposed
25 exhibit I provided to you, it is an article entitled

"Mercury Rising: Government Ignores the Threat of
Mercury From Municipal Waste Incinerators".

THE REGISTRAR: 490.

---EXHIBIT NO. 490: Article entitled, Mercury Rising:
Government Ignores the Threat of
Mercury From Municipal Waste
Incinerators.

MR. KLIPPENSTEIN: Q. It is an article
by Robert Collins and Henry Cole from September of
1990. Are you familiar with this article?

MR. DAWSON: A. No, I'm not. No.

Q. Do you know if it was used -- well,
presumably, you wouldn't know if it was used in the
preparation of Exhibit 344.

A. No, I wouldn't. I don't think it is
referenced at the end.

Q. It isn't, no.

A. Then it probably wasn't.

Q. If I can ask you to turn to the first
page of the Executive Summary, the article states that:

Municipal waste incinerators in the
U.S. emit on the order of 75,000 pounds
of mercury annually into the atmosphere.
Would it be fair to say or do you know whether that is
true or not? Can you comment on that?

A. I don't know, but I would suspect

1 that that may be true for incinerators that don't have
2 a fabric filter, spray dryer and fabric filter, on it.

3 Q. If you could turn the next page to
4 page (iii) under the heading "Finding 3", there are two
5 paragraphs with bullets.

6 A. Sorry, which heading?

7 Q. The heading "Finding 3"?

8 A. Right.

9 Q. And there are two paragraphs with
10 bullets, the gist of which is that according to the EPA
11 electrostatic precipitators in many incinerators fail
12 to capture the mercury emissions and that dry scrubbers
13 and bag house filters are not reliable when it comes to
14 mercury removal. Can you comment on that?

15 A. No, I can't comment on that. That is
16 what that says, I agree, and it is the EPA that is
17 saying it so I would agree it has some standing.

18 Q. Just to focus in on the issue here,
19 mercury is unusual because it becomes a gas at a
20 relatively low temperature and for that reason may
21 invade some of the normal emission control measures.
22 Have I got that right?

23 A. I believe so, yes. Yes. I mean, I
24 realize it vapourizes. I am a little surprised to see
25 that sort of a number because the gas temperature

1 having gone through a spray dryer would be down at
2 around 65 degrees celsius. I am surprised that it
3 hasn't condensed at that level.

4 Q. All right. On a slightly different
5 health topic or emission topic, would you agree that
6 Hydro has failed to consider the effect of the release
7 of CFCs as a result of incineration?

8 A. Of what, sorry?

9 Q. CFCs?

10 A. C-F...?

11 Q. CFCs, chloro...

12 A. ...fluorocarbons?

13 Q. Yes. That is not taken into account
14 in Exhibit 344, is it?

15 A. We have some numbers in figure 6-4-7
16 and 6-4-5. There are some values for dioxin and
17 furans, which I think are --

18 Q. My understanding is that is something
19 else.

20 A. I'm sorry, they are not the same
21 thing. So yes, I agree we haven't got those listed
22 there.

23 Q. And an information point while you
24 are flipping through Exhibit 344. On page 161, figure
25 6-4-1, a list of energy recovery facilities is given

1 with a total of 518 facilities.

2 Now, the word "incineration" isn't used.
3 Do you know how many of those are mass burn
4 incinerators?

5 A. I think I said in my direct evidence
6 that all but 40 of them were mass burn.

7 Q. I see. Okay. Thank you.

8 And finally, I believe an assumption of a
9 30 year life for a facility is used in the calculations
10 in Exhibit 344.

11 A. That is right, yes.

12 Q. Can you tell me the basis for that
13 assumption for the life of a facility? What are the
14 reasons for that?

15 A. It was just felt to be a reasonable
16 estimate of the life of an incinerator. I think we
17 responded to that in an interrogatory.

18 Q. And there did not appear to be any
19 factual analysis that backed that up other than just a
20 reasonable judgment; is that right?

21 A. Yes. Though, as a matter of fact, I
22 saw an article just last Friday that said that in Paris
23 they had just opened up a new municipal solid waste
24 incinerator at St. Ouen which replaced an existing
25 incinerator which had operated for 35 years. So there

1 are some instances at least where we have information
2 that suggests that incinerators can last for that
3 period of time.

4 Q. I take it that is the only example
5 you are aware of?

6 A. It is the only one that comes
7 immediately to mind, and I think when we looked, yes,
8 we had some difficulty in finding others that had been
9 around for 35 years, though again I think it is an
10 economic issue rather than a technical issue. You can
11 replace parts ad infinitum if you want to.

12 MR. KLIPPENSTEIN: Mr. Chairman, those
13 are all my questions.

14 Thank you, Members of the Panel.

15 THE CHAIRMAN: Mr. Thompson, are you very
16 anxious to start?

17 MR. THOMPSON: Not particularly, Mr.
18 Chairman. However, I am at your disposal. I am
19 prepared.

20 Should you wish to rise, I would be
21 perfectly happy to come in tomorrow.

22 THE CHAIRMAN: Well, I think in honour of
23 Mr. Shalaby's birthday we should stop early today.

24 MR. SHALABY: How nice.

25 THE CHAIRMAN: So we will adjourn until

1 tomorrow morning at ten o'clock.

2 THE REGISTRAR: This hearing will adjourn
3 until ten o'clock tomorrow morning.
4

5 ---Whereupon the hearing was adjourned at 4:46 p.m. to
6 be reconvened at 10:00 a.m. on Wednesday, February
7 26th, 1992.
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